SPECIAL ISSUE • TOP HINTS! • PRO ADVICE!

ANNUAL HOW-TO GUIDE

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Model Railroader®

January 2023
ModelRailroader.com

175+ tips & techniques!

- Lightning effects for your railroad p. 42
- Layout construction secrets p. 57
- Fast locomotive fixes p. 25
- Picture perfect scenery p. 22

7 detailed projects

SNEAK PEEK
MR's 2023 project layout p.44

Lance Mindheim built the HO scale Bishop Street Branch p. 44

PLUS

Welcome to the Bishop Street Branch p. 44

HO layout re-creates familiar vistas p. 28

VISIT…

LANZAROTE
Caliente.COM

F40PHM-2 LOCOMOTIVE

HO SCALE

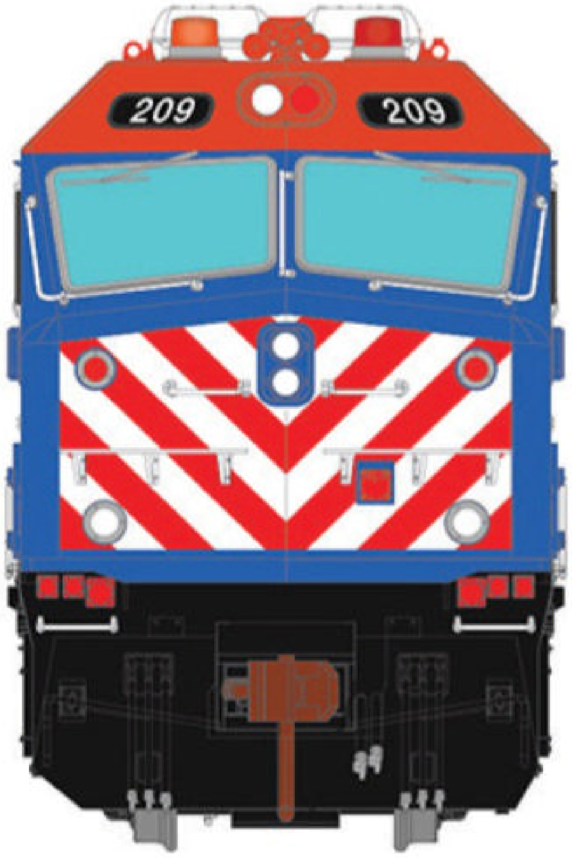
211
211
Metra
Metra
MAIN

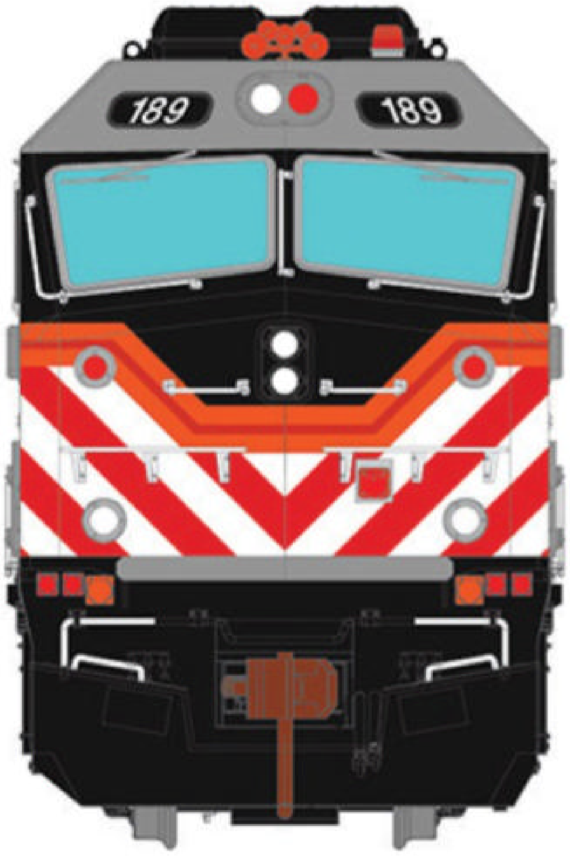
Rapido F40PHM-2 Features:

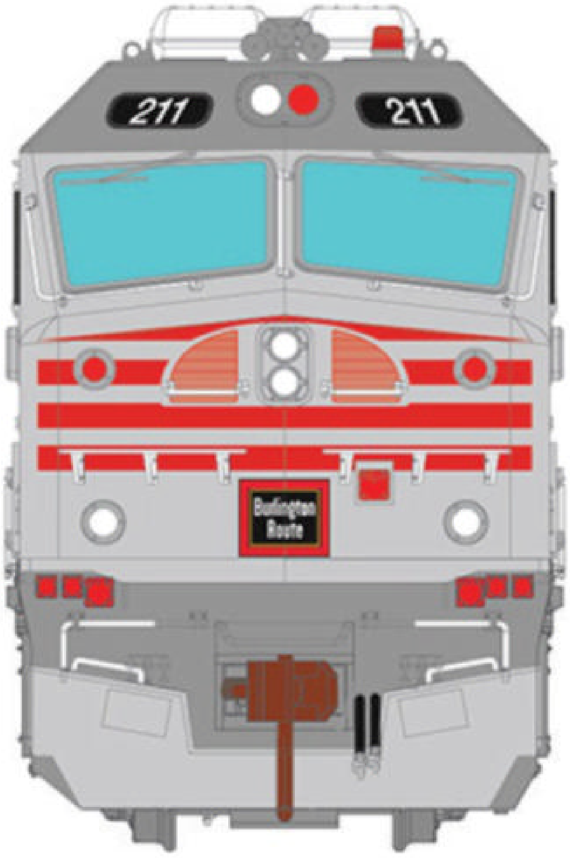
- Correct "Winnebago" style front
- Dual rooftop air conditioners
- Extensive, separate underbody piping, conduit and wire grab irons
- Working head lights, ditch lights, marker lights and backup light
- Working Gyralite, Stratolite or strobe light where appropriate
- PTC Antenna Array where appropiate
- Correct pilot plow or snow plow per model
- Sound-equipped models feature a custom ESU LokSound V5 decoder
- And much more!

***Not all lighting features will work in DC mode.**

Photos courtesy of Bobby Allard







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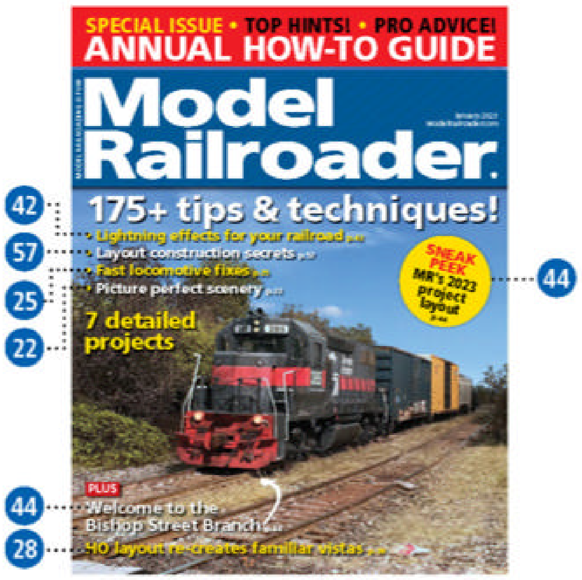
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On the cover: Turn to page 44 to get a first look at the HO scale Bishop Street Branch, our 2023 project railroad. Lance Mindheim photo

Next issue

In February, see how Lance Mindheim did the benchwork, track, and wiring for our project layout. Plus, two layout visits, building an art deco depot, and more!

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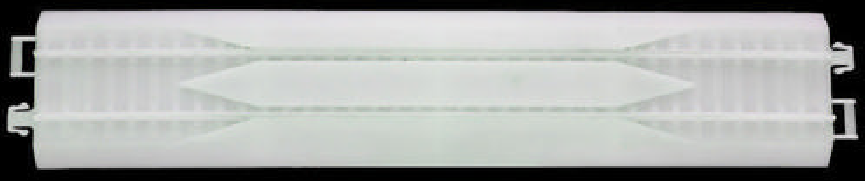

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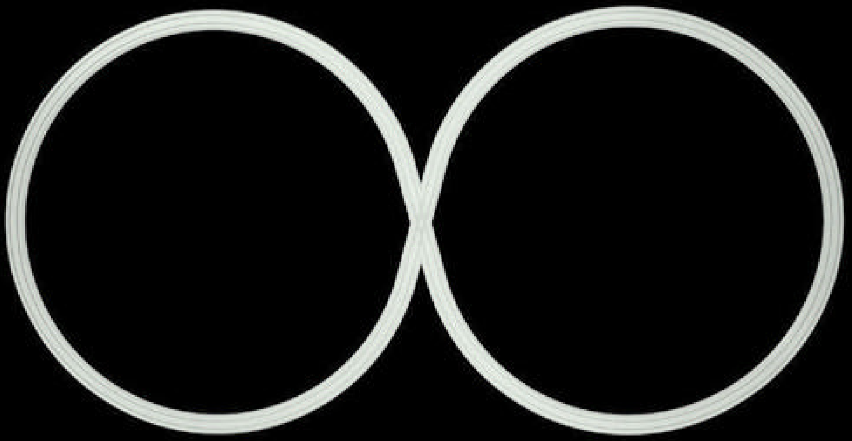

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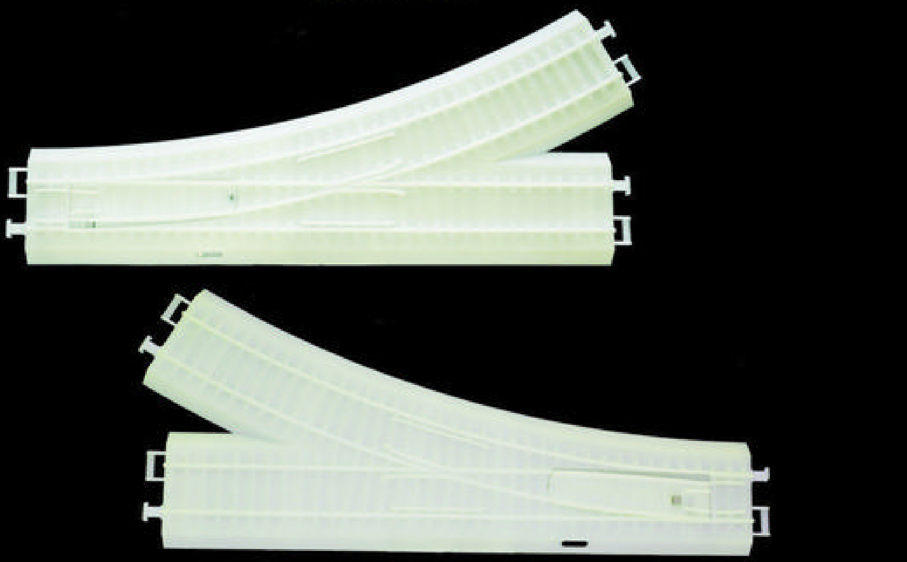

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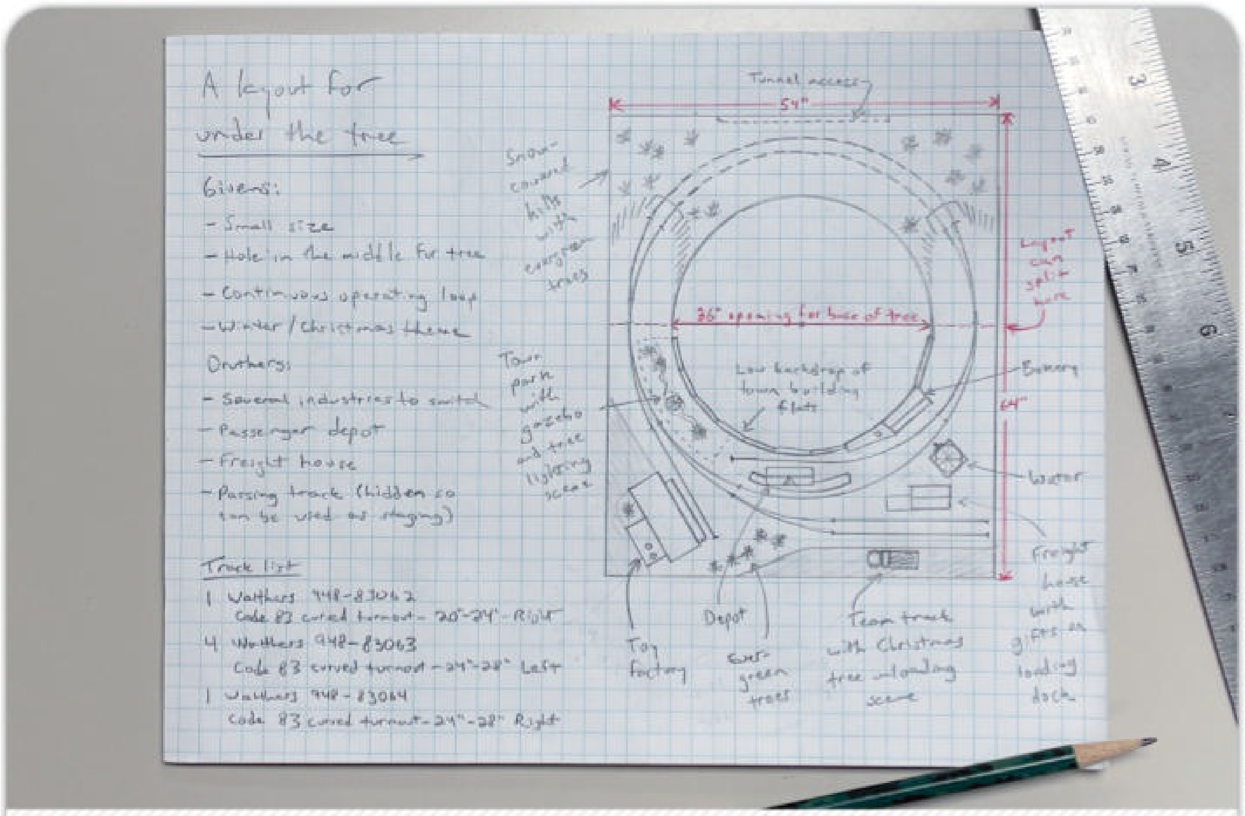

A layout for under the tree

Givens:
- Small size
- Hole in the middle for tree
- Continuous operating loop
- Winter / Christmas theme

Druthers:
- Several industries to switch
- Passenger depot
- Freight house
- Passing track (hidden so can be used as staging)

Track list
1 Walthers 948-83062
Code 83 curved turnout – 20"-24" – Right
4 Walthers 948-83063
Code 83 curved turnout – 24"-28" Left
1 Walthers 948-83064
Code 83 curved turnout – 24"-28" Right

Tunnel access
54"
Snow-covered hills with evergreen trees
Layout can split here
36" opening for base of tree
Low backdrop of town building flats
Bakery
64"
Town park with gazebo and tree lighting scene
Water
Freight house with gifts on loading dock
Toy factory
Depot
Ever-green trees
Team track with Christmas tree unloading scene

Track planning

After running a model train under the Christmas tree for hours on end, how does one make the basic circle layout more exciting? Senior associate editor Steven Otte creates a track plan for a circular layout under a Christmas tree that expands a loop into a layout with passenger and industry operations, multiple spurs, and a hidden staging track. Use these design elements to make your Christmas tree layout more than just a display. Find it in the Expert Tips section of the *Model Railroader* website.

Mr. Holland's layout

Did you know that musician, broadcaster, and founding member of the rock band Squeeze, Jools Holland, has his own layout? See this layout up close, read the advice given to Mr. Holland from Sir Rod Stewart, and marvel at the railway empire that Jools built. Many childhood and lifetime memories from throughout London and the whole continent are packed inside this layout. Find it in the How To section of the *Model Railroader* website.

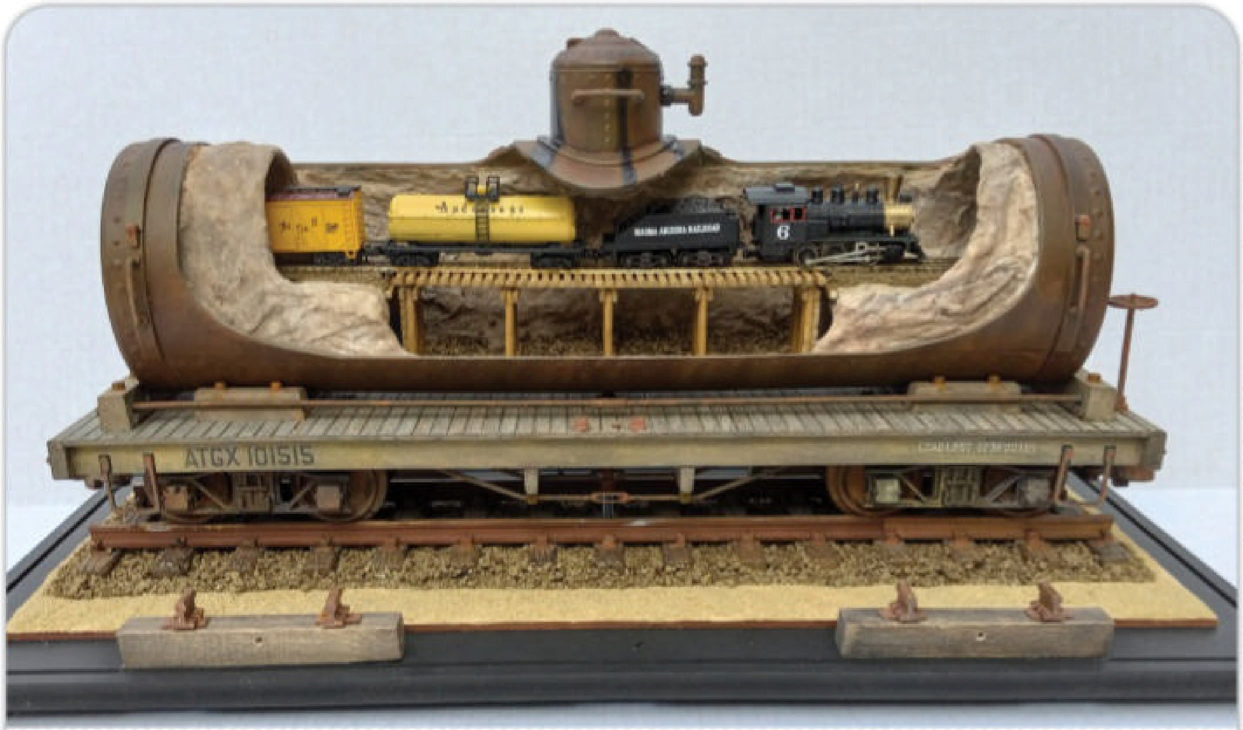

Photo gallery

What scale is it? Bud Sanders uses plenty of creativity to place an N scale train inside a large scale tank car. After much detailing and weathering, these off-the-shelf products from different scales are turned into a fascinating display. Bud shows the steps he took to achieve a successful train inside of a train. Find this in the How To section of the *Model Railroader* website.

Trains in motion

See trains running on Bob Cochran's HO scale Vermont Rail Systems (page 28) and on our new project layout, the Bishop Street Branch (page 44), built by Lance Mindheim. Lance also shows how he packs a layout for shipping! Scan the QR code to be taken to Trains.com.

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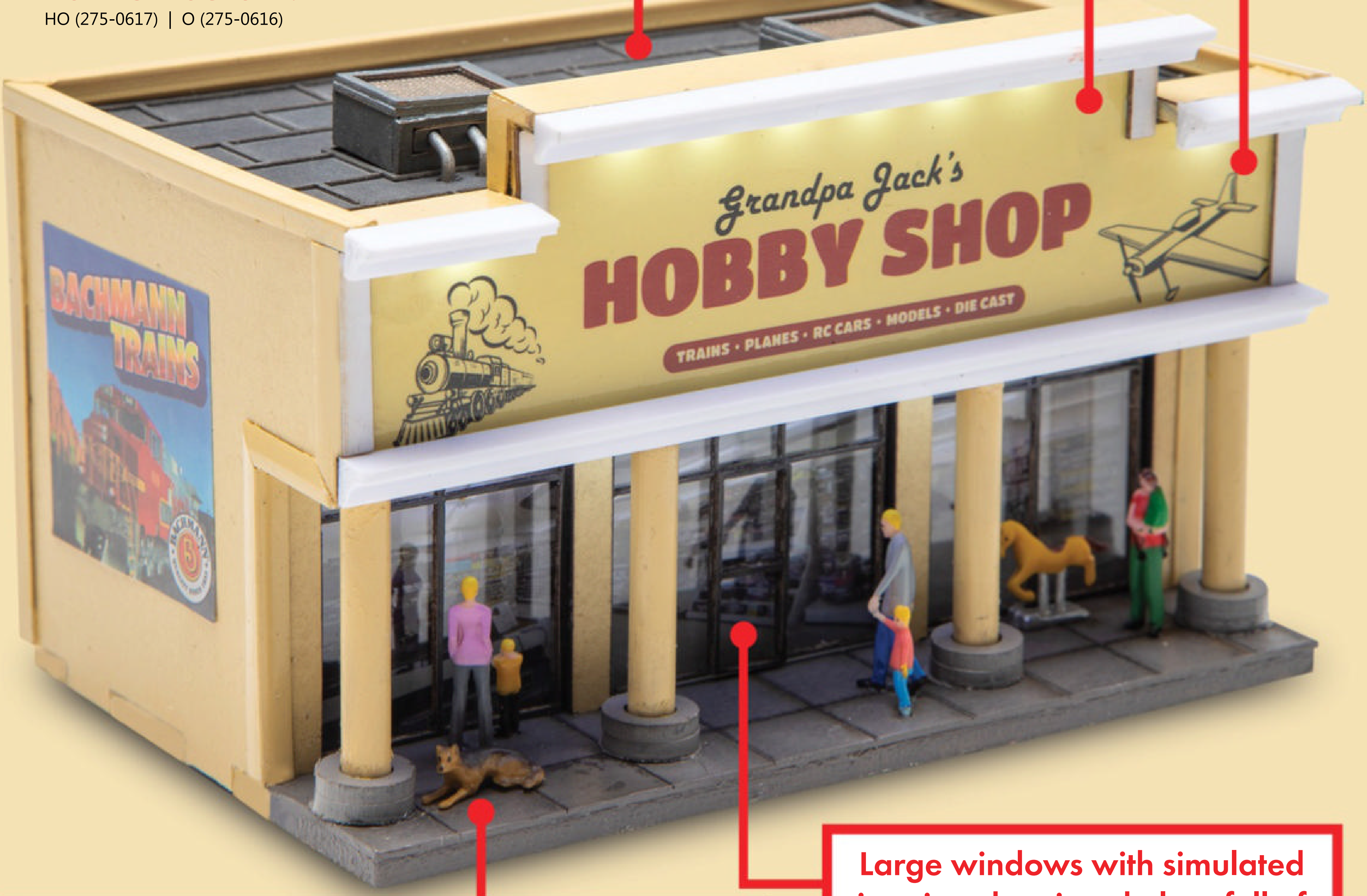
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By Eric White

Extra how-to from the how-to magazine

For 20 years, we've been bringing you a new project layout with the turn of the calendar. Project railroads in *Model Railroader* have been around for much longer than that, and for good reason.

First, we're model railroaders ourselves, and we like building things. It's fun to get in the workshop and let the sawdust fly. It's a great way to keep all of our skills sharp, since our own projects are in different phases. If you're building a model railroad, you only need to build benchwork at the beginning, right? Well, maybe not, but that's a topic for another note.

Another reason is to try new techniques and materials. Manufacturers come out with new products all of the time, and some of them, such as the new track products from Peco and Wm. K. Walthers Inc., are best tested in a project environment.

As for techniques, we're always going to clinics where we learn new ideas. We constantly receive stories from contributors – that's you, our readers – with fascinating concepts we want to try for ourselves. And talking to our friends inside and outside the office sparks new insights we want to apply.

But the main reason we do this is to create content for the magazine and Trains.com. *Model Railroader* is a how-to magazine, so we need to be able to show readers how to do things. We've packed this special issue with how-to content covering a wide range of subjects. A project layout lets us do all of the things a modeler will need to do over the life of their layout, and do it in a logical sequence so readers can see how it all fits together.

This time, we've given ourselves a break and turned to longtime contributor Lance Mindheim, who is also a professional layout builder. We thought it would be useful to let readers see how someone else does things.

Lance will take us through the construction of the Bishop Street Branch over the next three issues, following its introduction on page 44 of the magazine you're reading now.

We hope you'll be inspired to pick up your tools and clear some space in the workshop as well. Whether it be a layout project or something smaller, it's always good to be building.

Mitch Horner

Speaking of building, we've been doing some building on our staff, and welcomed Mitch Horner as our new assistant digital editor. Mitch will focus on content for our Trains.com website, along with duties for the magazine. Mitch is a recent graduate of the University of Wisconsin-Milwaukee with a degree in English.

It's an exciting time to be a model railroader!

Model Railroader

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For some, a new home in an apartment, condo or assisted living facility means leaving their layout behind. What better way to keep doing the hobby they love! These 'kitchen table' modeling kits take up little room and arrive each month allowing plenty of time between kits. And when completed, can be proudly displayed and used to showcase a favorite locomotive and a car or two.

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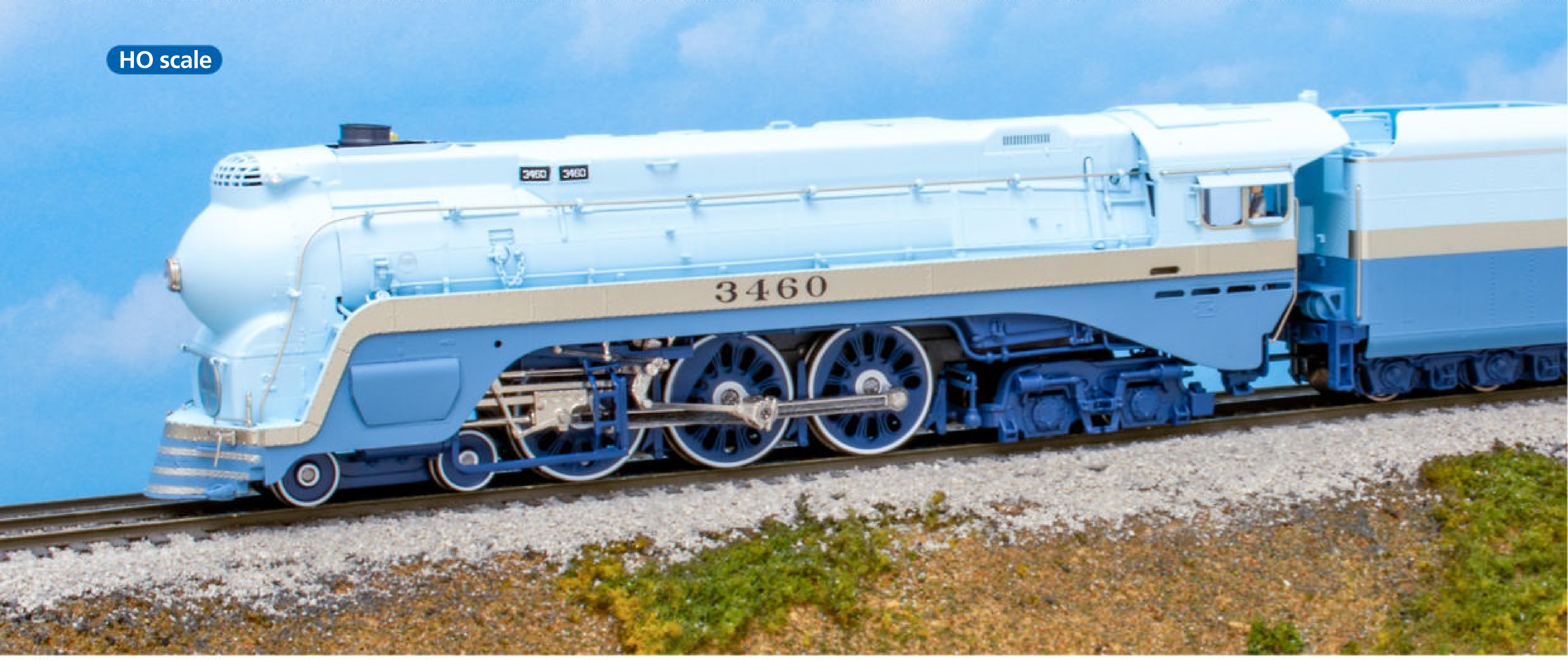
BUILD-A-WORLD

HO scale

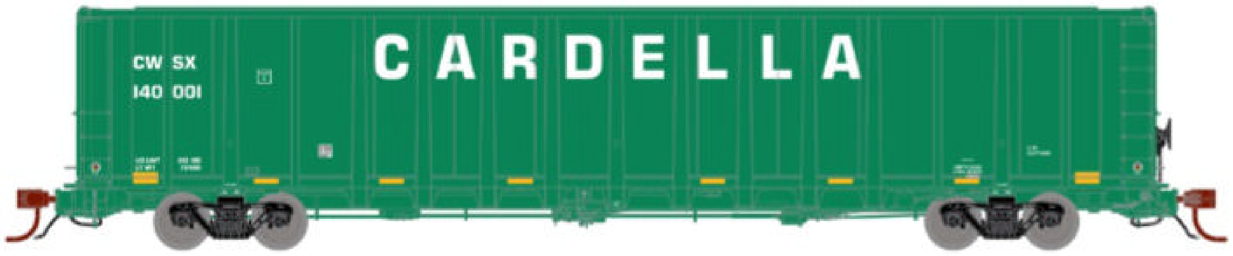


Santa Fe 4-6-4 "Blue Goose" steam locomotive No. 3460. Broadway Limited Imports recently released this streamlined locomotive in its Paragon4 Brass-Hybrid series. The HO scale model is decorated in six versions of Santa Fe's "Blue Goose" scheme (as delivered with and without the road number on the side of tender and in early 1939, 1941, 1950 and 1951-1953 appearance). The model is also available painted brass but unlettered. The 4-6-4 ($899.99) features a dual-mode Paragon 4 sound decoder with Rolling Thunder, brass and die-cast metal construction, a 5-pole skew-wound can motor, and a smoke unit. Broadway Limited Imports, 386-673-8900, broadway-limited.com

Athearn announces NSC 6400 gondola

National Steel Car (NSC) 6,400-cubic-foot capacity gondolas will join Athearn's HO scale Genesis line in December 2023. The 69-foot plate C cars, which are typically found in scrap metal service, can be found in modern freight trains throughout North America and have a build range from 2006 to present.

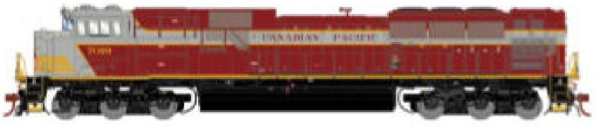
The Athearn Genesis models will feature prototype-specific details showcasing the nine build variations that NSC produced. Additional features include separate, factory-applied metal grab irons; etched-metal crossover platforms where appropriate; brake piping with metal and plastic components; McHenry lower-shelf couplers; and rotating bearing caps. The cars have a minimum radius of 22" and a recommended radius of 24".



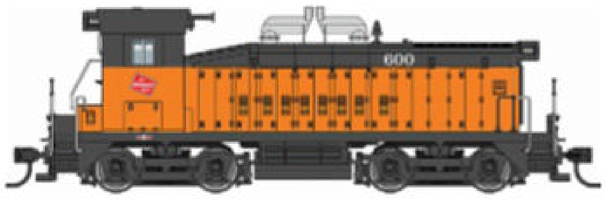
A National Steel Car 6,400-cubic-foot capacity gondola is the latest addition to the HO scale Athearn Genesis line.

Road names in the first run include Cardella Waste Service of New Jersey (green with CWSX reporting marks), American Iron & Metal (gray with AIMX reporting marks), DEAX (gray), Murphy Road Recycling LLC (black with MRRX reporting marks), Residco (gray with OFOX reporting marks), and IWWX (dark green). Single cars will be priced at $64.99, and two-packs will sell for $109.99. The gondolas are scheduled for release in December 2023. For more information, visit athearn.com.

HO scale locomotives



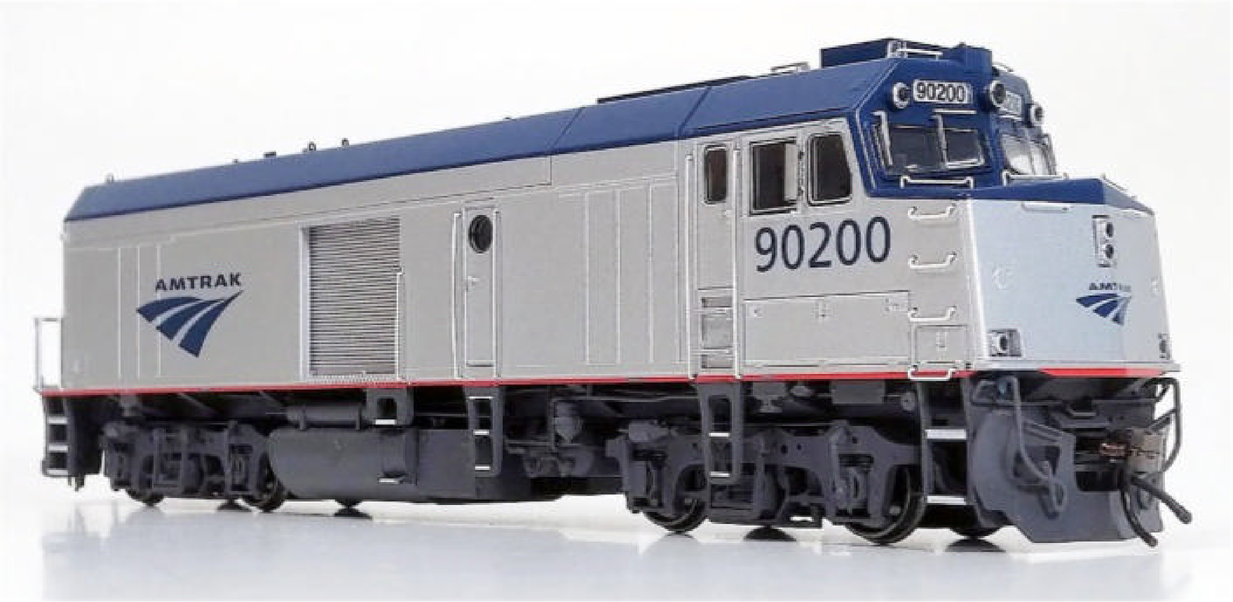
- **Electro-Motive Diesel SD70ACU.** Canadian Pacific (maroon-and-gray heritage scheme with block lettering and CP System Red with monochrome beaver logo in two numbers each; NATO Green and two-tone gray in one road number each), Progress Rail Leasing (Primed for Grime Norfolk Southern patchout in two numbers), and Norfolk Southern (Thoroughbred scheme in three numbers). Celcon handrails, detailed cab interior, rotating bearing caps, and factory-applied wire grab irons. Direct-current model, $259.99; with dual-mode sound decoder, $359.99. Add $10 for Primed for Grime. Athearn Trains, 800-338-4639, athearn.com



- **Electro-Motive Division SW1200, SW9, and SW900.** SW1200: Milwaukee Road (orange and black), Missouri-Kansas-Texas (green and yellow), Soo Line (red and white), and Southern Pacific (scarlet and gray). SW9:

SANTA FE
3460

Rapido announces products at open house



Among the announcements made at the Rapido open house was a second run of Amtrak Non-Powered Cab Units. The models will be powered and offered in direct current (no sound) and with a dual-mode sound decoder. This run will include Amtrak's "Salutes our Veterans" unit in two numbers. Rapido Trains Inc. photo

Rapido Trains Inc. announced several new products at a dealer open house at the Illinois Railway Museum in Union, Ill. The event was held in early October.

A new run of Amtrak's Non-Powered Cab Units (NPCU) and an Electro-Motive Division (EMD) F40PHM-2 were among the HO scale locomotive announcements.

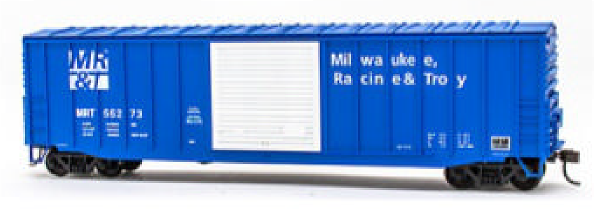
The Amtrak NPCUs will be powered in both silent DC and dual-mode sound-equipped versions. In addition to separately applied details, the models will feature light-emitting diode headlights, strobe lights, marker lights, ditch lights, and number boxes. Rapido will include Amtrak's "Salutes our Veterans" units for the first time in this release.

The F40PHM-2, offered in four Metra schemes, will feature a Winnebago-style short hood as well as separate underbody piping, conduit, and grab irons. The light-emitting diode light package will include headlights, marker lights, a backup light, ditch lights, a Gyralite, and stratolites or strobe lights as appropriate. Sound-equipped models will be fitted with an ESU LokSound V5 sound decoder.

One of the freight cars announced was the Procor 5,820-cubic-foot capacity covered hopper in N scale. The covered hopper will be offered with three styles of roof hatches and two styles of outlet gaskets and full end cage details. For more coverage of the Rapido Trains dealer open house, visit Trains.com.

Chesapeake & Ohio (dark blue and yellow); Grand Trunk Western (blue and orange); and Toronto, Hamilton & Buffalo (maroon and cream). SW900: Lehigh Valley (red with black stripes). Four road numbers per scheme. Also available undecorated. Road-specific details, detailed cab interior with seats and crew figures, factory-installed wire grab irons, and sill- or hood-mounted handrails as appropriate. Direct-current model, $199.98; with dual-mode sound decoder, $299.98. Wm. K. Walthers Inc. 414-527-0770, walthers.com

HO scale freight cars



- **American Car & Foundry 50'-6" boxcar.** Milwaukee, Racine & Troy (blue with white lettering). One road number. Separate underbody details, factory-installed brake wheel; modeler-installed doors (two each 10-foot plug and Youngstown); and molded ladders, crossover platforms, and stirrup steps. Roller-bearing trucks with plastic wheelsets. Screws for trucks and draft-gear box covers. Accumate couplers with modeler-installed trip pins. $27.99. Produced by Accurail, available from the Kalmbach Hobby Store, KalmbachHobbyStore.com
- **Class GKa/GKb 46-foot battleship gondola.** Norfolk & Western. Unpainted one-piece cast urethane body with integral frame, cast urethane detail parts, Yarmouth etched bronze eyebolts, decals covering all versions of the car, and step-by-step instructions and history sheets. No trucks included; Labelle Models Pilcher six-wheel trucks (No. HO-528, sold separately) are recommended. $47. Westerfield Models LLC, 303-658-9343, westerfieldmodels.com

- **General Steel Castings 58'-4" depressed-center flatcar.** Louisville, New Albany & Corydon (red with "Red 'n Ready" slogan); Atchison, Topeka & Santa Fe (mineral brown); Baltimore & Ohio (black); Chicago & Eastern Illinois (mineral brown); Conrail (mineral brown, with and without "can opener" herald in two road numbers each); CSX (dark blue with Baltimore & Ohio reporting marks, red in two numbers); Erie (black); Erie Lackawanna (black); Missouri-Kansas-Texas (green); Missouri Pacific (mineral red); Soo Line (white); Southern Ry. (mineral brown, with square jacking pads in one number and "A" style jacking pads in three numbers);

N scale

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40-foot steel boxcars. These new N scale boxcars from Broadway Limited Imports are available in two- and four-packs and represent a variety of railroads and eras. Four-packs of these cars include two sets each decorated for Michigan Central, Boston & Albany, New York Central, and Peoria & Eastern; and Delaware, Lackawanna, & Western, New York Central, Northampton & Bath, and Reading Co. Two-packs are offered decorated for Boston & Maine; Chesapeake & Ohio; Chicago & North Western; Delaware & Hudson; Great Northern; New York, New Haven & Hartford; Northern Pacific; New York Central; Southern Pacific; Union Pacific; and Merry Christmas. The cars feature an ABS plastic body and chassis, factory-applied doors, running boards, brake wheel, and brake platform. Two-packs are $54.99 and four-packs are $104.99. Broadway Limited Imports, 386-673-8900, broadway-limited.com

HO scale

TILX
640624

Trinity 6,356-cubic-foot capacity four-bay covered hopper. This Proto-series HO scale model is in stores now. Road names for the four-bay covered hopper include Trinity Industries Leasing (gray and black [75th anniversary] schemes), Archer Daniels Midland (gray with current logo), Bunge North America Inc. (gray), Incobrasa Industries Ltd. (green), and Vera-Sun Energy (tan). Each paint scheme is available in four road numbers. The HO scale model ($49.98) features factory-installed wire grab irons, vibrator brackets on the discharge outlets, see-through etched-metal walkways and crossover platforms, and one of two styles of trough hatches as appropriate. Wm. K. Walthers Inc. 414-527-0770, walthers.com

Club offerings

- **Studebaker Corp. United States Railroad Administration 34-foot two-bay hoppers (two schemes) and Wabash 40-foot single-sheathed boxcar with NJI&I reporting marks.** Accurail HO scale kits produced for the Illini Chapter of the Professional Car Society. One road number per paint scheme (renumbering decals available). Single car, $23.95. Shipping, one car, $9.45; multiple cars, $10.35 to USA addresses; $22.10 for foreign orders of any size. Illini Chapter PCS, 918 W. Colfax St., Palatine, IL 60067

LEHIGH STONE
KMRC
1506

- **Lehigh Stone three-bay offset-side hopper.** Accurail HO scale kits produced for the Kankakee Model Railroad Club. Three road numbers. Single car $30; assembled with Kadee couplers, $35. Shipping $6 per car. Kankakee Model Railroad Club, 197 S. East Ave., Kankakee, IL 60901

St. Louis-San Francisco (Frisco, mustard yellow); and Union Pacific (mineral red). One number per paint scheme unless noted. Railroad-specific body and deck, dual-end brake system, and GSC three-axle trucks upgraded to roller bearings with rotating bearing caps. $64.99. ClassOne ModelWorks.com, 816-243-0044, classonemodelworks.com

- **Pacific Car & Foundry R-70-15 refrigerator car.** Sun Belt System (white with yellow, orange, and maroon markings) and Virginian & Ohio (orange and blue with white roof). Six road numbers per scheme. Etched-metal side screens and roofwalk supports, InterMountain metal wheelsets. Minimum radius 22". $50. Produced by InterMountain Railway Co., available from Three Notch Rail, threenotchrail.blogspot.com
- **Pullman-Standard 60-foot flatcar.** TTX (yellow and black with OTTX [farm machinery service], HTTX [heavy-duty loading], and VTTX [20- and 40-foot container loading, eight road numbers] reporting marks), Alaska RR (dark blue), BNSF Ry. (Oxide Red), Illinois Terminal (yellow), and Southern Ry. (brown). Four numbers per scheme unless noted. Detailed decks, board pattern, brake wheel cutout, and brake gear and piping. $34.98. Wm. K. Walthers Inc. 414-527-0770, walthers.com

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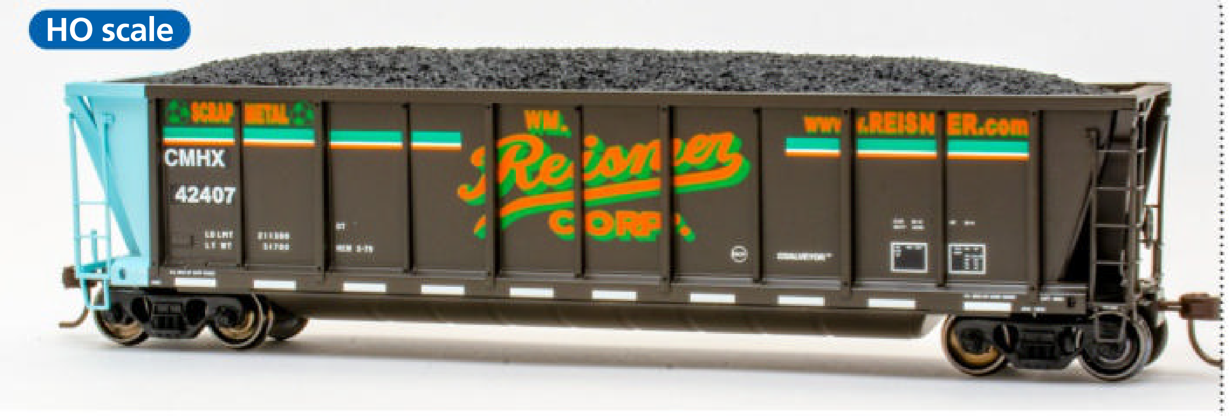
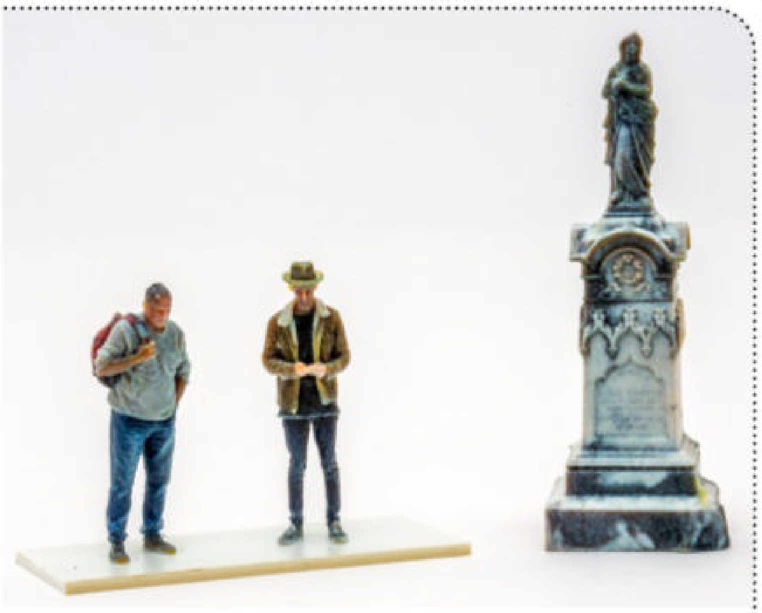


American Car & Foundry Coalveyor bathtub gondola. This HO scale Atlas Master Line car is in hobby shops now. New paint schemes include CarMath (with Wm. Reisner Corp. lettering), Chicago & Illinois Midland (four road numbers), Cobra Trading (black and white), David Joseph (blue and white and teal and white schemes), Frontier Scrap Metals (black, blue, and yellow), and RMB Leasing (black and blue). Four new road numbers are offered on cars lettered for Kansas City Power & Light (black and white) and Utility Fuels (black and orange). Features on the HO scale gondola include a die-cast metal chassis, interior bracing, a removable coal load, brake detail, and 100-ton roller-bearing trucks with metal wheels. Single cars are priced at $39.95, and undecorated models sell for $30.95. Atlas Model Railroad Co., 908-687-0880, shop.atlasrr.com

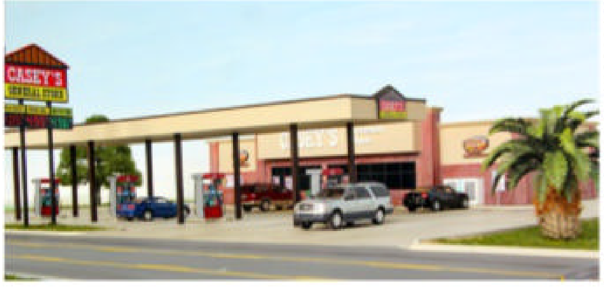
O scale



Assorted figures and details. Industry newcomer West Edge 3D offers an assortment figures and details in 1:43.5 and 1:48. The manufacturer offers figure four-packs for $47.95 each, cemetery memorial and statue sets for $68.95 each, and headstone sets for $52.95 each. The full-color figures and details are 3-D printed in UV-cured resin. The company also produces the items in N, TT, HO, and large scales, as well as British N and OO and other sizes on request. West Edge 3D, 0412-574-151, westedge3d.com.au

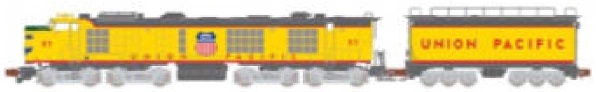
Canada scheme and Renaissance green scheme], HEP 2 (club and coach with blue and yellow band, economy in Renaissance green scheme, and business in Renaissance gray scheme) and Canadian Pacific (maroon and Action Red). Also available painted stainless steel but unlettered (HEP 1, HEP 2, and standard Budd coach). Stainless steel finish, prototype-specific details, track-powered lighting, 41-NDO-11 trucks with end frames, and metal couplers. HEP 2 cars feature new side window arrangements. $124.95. Rapido Trains Inc., 905-474-3314, rapidotrains.com

HO scale structures



- **Casey's General Store.** Laser-milled styrene, laser-cut white and clear acrylic, and self-adhesive micro-plywood parts. Includes gas pumps, ice box, signs, and photo-illustrated instructions. Parking lot base not included. Building measures 13¼" x 5¾" x 3". Canopy footprint is 14¾" x 2¾" x 3". $120. Summit USA, 337-436-8481, summit-customcuts.com

N scale locomotives

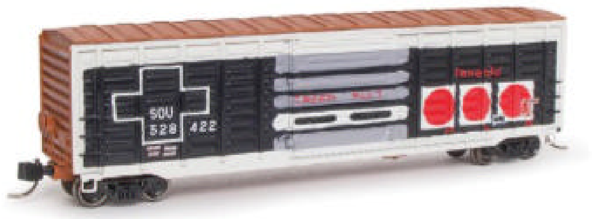


- **General Electric standard turbine.** Union Pacific (with tender in four road numbers, without tender in one number). Farr side grills, front and rear trainline hoses with silver gladhands, wire grab irons, cab interior with floor, control stand, seats and rear wall, and all-wheel electrical pickup. Operating light-emitting diode-illuminated lighting including a directional rear tender light with lens. Photo-etched metal deck walkway, end ladders, and factory-applied air tank, brake cylinder, and control valve on tender. Minimum radius, 11", recommended radius, 18". Direct-current model: without tender, $144.99; with tender, $189.99. With sound decoder: without tender, $244.99; with tender, $289.99. ScaleTrains, 844-987-2467, scaletrains.com

N scale freight cars

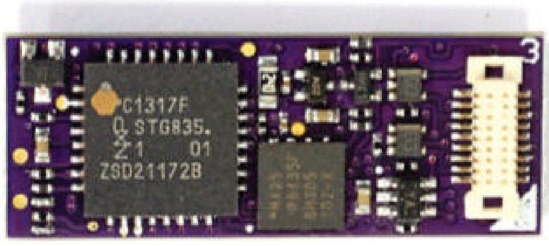
- **52-foot mill gondola.** St. Louis-San Francisco (Frisco, brown with white lettering), Chesapeake & Ohio (Railgon renumber, Primed for Grime), Conrail (brown with "can opener" and Quality heralds), Denver & Rio Grande Western (Railgon renumber, Primed for Grime), Norfolk Southern (black), and Railgon (black and yellow with GONX reporting marks, two single cars and one three-pack). Two road numbers per road name unless noted. Upgraded molded details, stirrup steps, and nut and bolt detail; injection-molded plastic body; body-mounted McHenry scale couplers; and metal wheelsets. Single car, $34.99; three-pack, $89.99. Add $5 for Primed for Grime. Athearn Trains, 800-338-4639, athearn.com

- **53-foot spine car.** TTX (TTAX reporting marks; three-platform car in six road numbers, five-platform car in four numbers). Also available undecorated in both body styles. Die-cast metal and plastic construction, etched-metal walkways, assembled collapsed or raised hitches, BLMA 70-ton American Steel Foundries Ride Control trucks, and metal wheels. Three-platform, $119.95 ($99.95 undecorated); five-platform, $199.95 ($164.95 undecorated). Atlas Model Railroad Co., 908-687-0880, shop.atlasrr.com



- **Pullman-Standard 5,277-cubic-foot capacity waffle-side boxcar.** TrainLife.com exclusives (three numbers each unless noted): Southern Ry. (controller graffiti [one number] and 1974 as-delivered scheme), and Family Lines (1980 as-delivered scheme with Clinchfield, Georgia RR, and Seaboard Coast Line marks). ExactRail offerings: Southern Ry. (1976 as-delivered scheme with and without Central of Georgia reporting marks in six road numbers each, 1977 as-delivered scheme with Georgia Southern & Florida marks in three numbers, 1984 Europa repaint in three numbers, and 1986 Claytor repaint in three numbers). American Steel Foundries 70-ton Ride Control trucks, CNC machined metal wheels, and Micro-Trains No. 1015 couplers. $29.99. ExactRail, 866-945-1701, exactrail.com

Electronics/controls



- **TSU-N18 sound decoder.** Steam-2, EMD diesel, EMD-2 diesel, GE diesel, Alco diesel, Baldwin and other diesels, and electric. Sound library includes 10 exhaust chuffs, up to 12 diesel engines per profile, up to 12 bells, 90 whistles, and more than 40 air horns. Plugs into locomotives equipped with a Next18 socket. Six function outputs and 16 sound channels. Can be wired to a CurrentKeeper. Measures 25 x 9.5 x 4.1mm. $124.95. SoundTraxx, 970-259-0690, soundtraxx.com

In Memoriam

Iain Rice, 1947-2022

Bryony Rice photo

Iain Rice, 75, passed away on October 8. Iain wrote more than 400 articles, including contributions to Kalmbach Media's *Model Railroad Planning* and *Model Railroader.*

Rice also wrote more than 20 books, including *Small, Smart & Practical Track Plans* (2000), *Mid-Sized & Manageable Track Plans* (2003), *Shelf Layouts for Model Railroads* (2009), and *Compact Layout Design* (2015) for Kalmbach.

The prolific track planner had a wide range of railroad interests and preferred to tackle a series of smaller modeling projects covering diverse subjects rather than concentrating his efforts in a single large undertaking.

Dick Elwell, 1935-2022

Kip Grant photo

Dick Elwell, 87, died October 21 after a 14-year battle with cancer. "Even after going through numerous medical procedures to cope with the disease, Dick's positive attitude and lust for living shined through," said *Model Railroader* magazine contributing editor Lou Sassi, who was also one of Dick's longtime friends. Dick built the well-known Hoosac Valley RR, which was featured in multiple publications including *Model Railroader* and *Great Model Railroads 1996* and *2008*. He is survived by his wife of 65 years, Sandy.

W. Allen McClelland, 1934-2022

Paul J. Dolkos photo

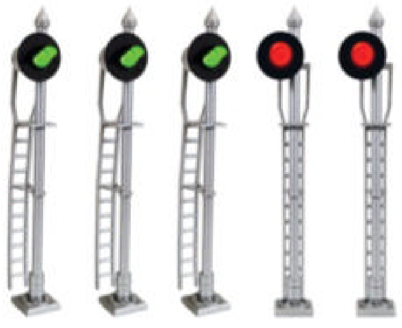
W. Allen McClelland, 88, passed away on October 28, following a stroke the previous day.

Allen built the well-known HO scale Virginian & Ohio, the subject of books, videos, and numerous magazine articles over the years.

Among the many accomplishments Allen made with the V&O were walkaround command control, a pre-computer Centralized Traffic Control system, and beyond-the-basement traffic planning.

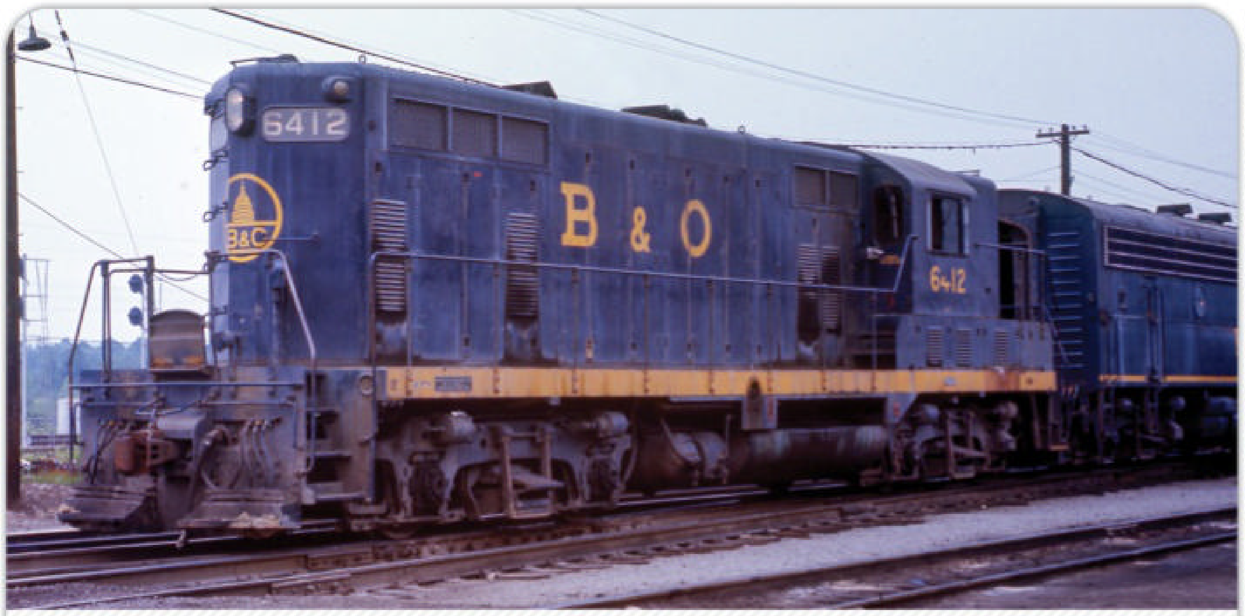
Model Railroader contributing editor and *Model Railroad Planning* editor Tony Koester, who has known Allen since 1970, wrote that "on top of everything else, he was among the finest people I have ever met, always ready to help, always willing to share. With his passing, the door has been closed on one of scale model railroading's most important and prolific eras." (Tony's tribute to Allen is on page 82 of this issue.)

Tony wrote a book for Kalmbach Media, *Allen McClelland and His Virginian & Ohio*, documenting how the V&O and Allen McClelland changed model railroading forever. The book is scheduled for release in January 2023.



- **Super Signals.** Hand-built with fine detail out of copper tube and resin. Red/green light-emitting diode provides two light aspects. Three-wire installation with instructions included. Five- and 10-packs include bonus relay cabinets. Single, $39.99; five-pack, $179.99; and 10-pack $349.99. Dallas Model Works, 888-876-5434 (10 a.m. to 5 p.m. Central time), dallasmodelworks.com

By Steven Otte



The Baltimore & Ohio stuck to a fairly uniform paint scheme for its freight locomotives throughout most of the diesel era – dark royal blue with yellow lettering and a yellow sill stripe. The fuel tank, air tank, and trucks, along with pretty much everything under the sill, were painted black. Baltimore & Ohio No. 6412, an Electro-Motive Division GP7, is seen at New Castle, Pa., on July 19, 1969. R.W. Richards photo, Thomas Hoffman collection

Questions on decorating B&O diesels

Q I have two questions on decorating Baltimore & Ohio diesels. I would like to know what color the fuel tank, air reservoir, and trucks were on a B&O GP7. Second question, what type of horns did these locomotives have, and where were they placed on the locomotive?

Barry Geiger

A The Baltimore & Ohio had one of the handsomest passenger diesel paint schemes I've ever seen. The body was a deep blue, the top was a medium blue-gray, and the center of the body bore a very dark blue, almost black, band bordered by thin yellow stripes. Though this scheme was developed for (and in my opinion looked best on) cab units like the Electro-Motive Division E7 and Alco FA2, variations were worn by Baldwin sharknoses, steam-generator-equipped EMD hood units, and even the railroad's Baltimore Harbor car float tug, the *Hugh L. Bond Jr.*

Freight hood units and diesel switchers, on the other hand, got a considerably less flashy paint scheme. These unglamorous workhorses had often had a wide yellow sill stripe, and sometimes a single yellow pinstripe high on the hood, but for the most part they were solid B&O blue.

But you asked about the diesels' undercarriage. Prototype photos show that regardless of the paint scheme, everything under the sill on a typical B&O diesel was painted black. Tru-Color Paint, available through Wm. K. Walthers Inc. as well as local hobby stores, has acrylic lacquer hobby paint to match the colors in B&O's diesel schemes. The passenger and freight schemes alike were based on a deep royal blue also used by the Chesapeake & Ohio. The two railroads also shared the same yellow paint. The gray used on the B&O passenger scheme is likewise the same as C&O Gray. The color of the band on the passenger scheme was called Bando Blue.

Most early diesels were delivered with unmelodic single-chime Wabco horns. Nathan developed several multi-chime horns in the early 1950s, which B&O management tested and liked. Starting in 1953, all B&O diesels were delivered with Nathan horns – five-chime on passenger units, three-chime on freight power, and two-chime on switchers. Older diesels were refitted with Nathans, as well, as maintenance schedules allowed. The B&O's GP7s were delivered in 1953, so they would all be equipped with three-chime horns. Photos show they were mounted in the center of the long hood.

Q How long can I run a locomotive in one operating session without possibly causing mechanical or electrical damage to the model? What about causing damage to a DCC board? Also, is there a difference in recommended running times for regular DC versus DCC-equipped locomotives?

Nathan Penn

A I don't believe you need to worry about that much. Electric motors and moving parts do experience wear, but model trains on museum layouts and store displays run continuously for days on end without that becoming an issue. As long as you keep your locomotives properly maintained, adding a drop of light oil to the axles and plastic-compatible grease to the gears now and then, it shouldn't become an issue.

Q How were steam era water tanks filled? Was special water tank rolling stock used?

Tony Gastler

A No, steam-era water tanks were generally not filled with water brought by train, except in the desert. Water towers were connected to a water source at the tank's location, whether a well or a nearby body of water like a river or reservoir.

Under most trackside water tanks in temperate to colder climes, you'll see a square enclosure with a door on it. That's called a "frost box." Its purpose is to protect the water pipe that fills the tank from freezing. If a steam-powered or electric pump is needed to lift water up to the tank, it will usually be in the frost box. If the tank is in a warm area and has no frost box, there will likely be a nearby pump house. Another way is to fill the tank with a gravity feed from a water source that's higher than the tank, like a reservoir, lake, creek, or river.

A large steam locomotive servicing area might have just one water tank, set back from the tracks. Locomotive tenders would be filled from trackside water columns connected to the distant tank by pipes run under the tracks. These are a good choice if your locomotive servicing area doesn't have room for even a small tank. Just put in a water column and assume the tank feeding it is off the edge of the fascia.

Send questions to senior associate editor Steven Otte at AskTrains@Trains.com.

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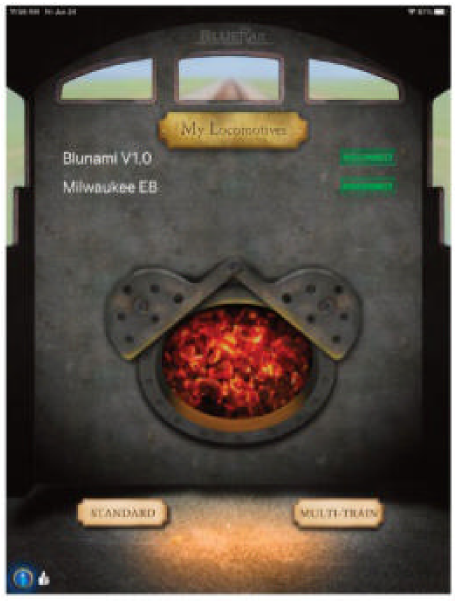

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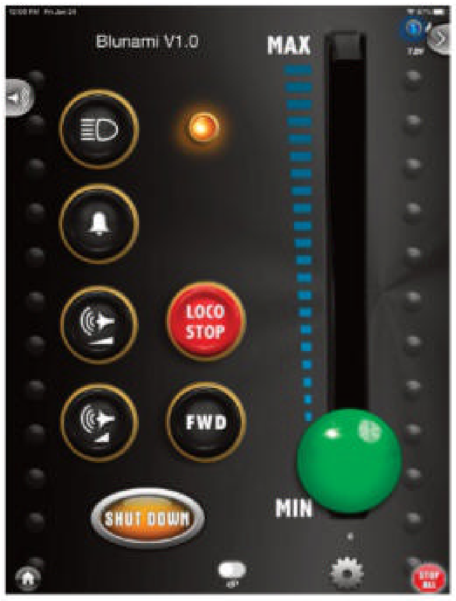

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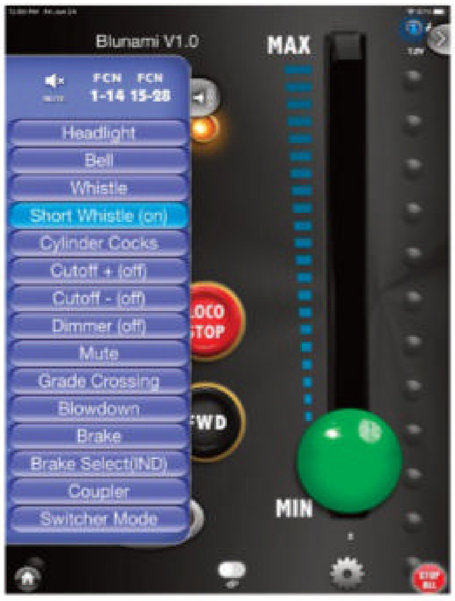

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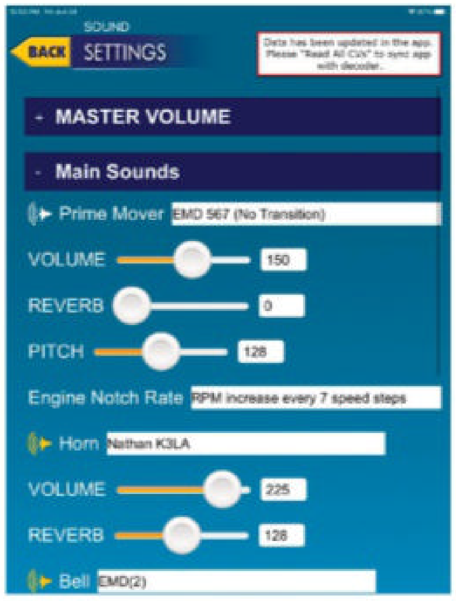

BACK
SOUND SETTINGS
- MASTER VOLUME
- Main Sounds

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Prime Mover: EMD 567 (No Transition)
VOLUME: 150
REVERB: 0
PITCH: 128
Engine Notch Rate: RPM increase every 7 speed steps
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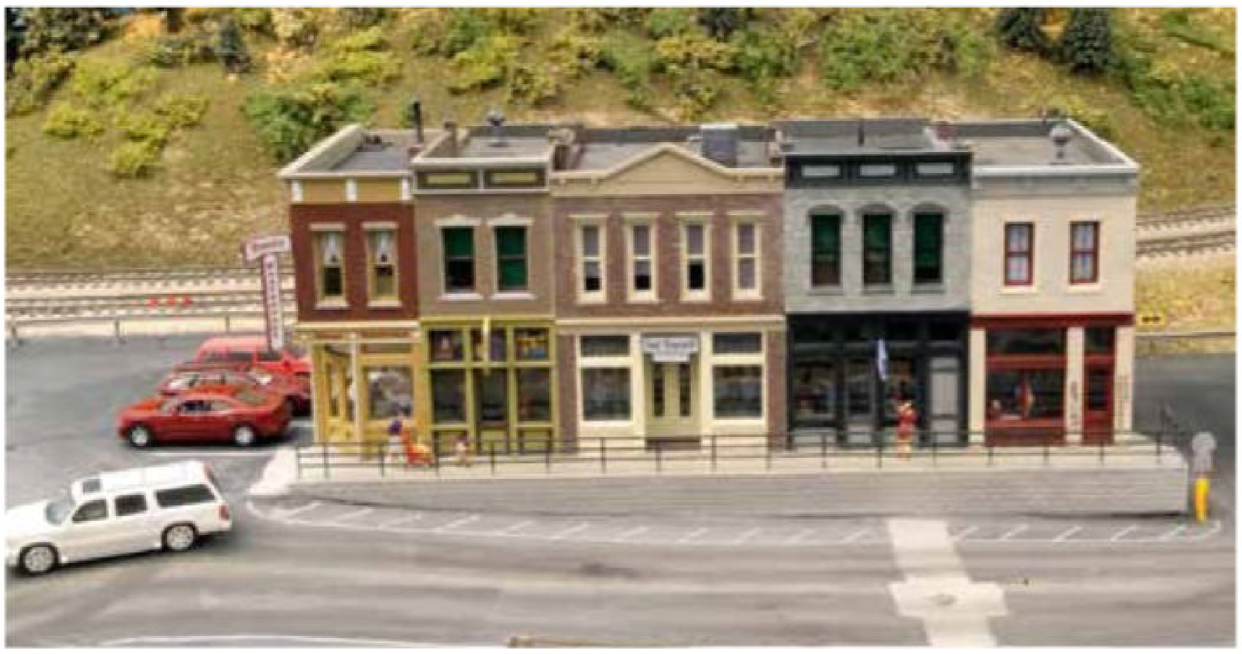
Q In the ’70s I built an HO scale layout for my sons. Not knowing any better, I used flat black paint for my roads and streets. Now my sons are grown up, and I want to get back in the hobby with a new layout. Is flat gray better for streets? What do you folks use?

Danny Marso

A When we model roads on our project layouts, we use a variety of materials to color them – paint, pigments mixed into the paving plaster, and weathering powders brushed on top. But the goal is always gray. Asphalt may go down a very dark gray that looks close to black, but it doesn’t stay that way for long. The older your roadway and the sunnier your climate, the lighter gray you should use.

Look closely at the roads in the real world and you’ll see other ways you can make your modeled roads look more realistic. Well-worn traffic lanes often have slightly darker stripes where the wheels travel. Pavement cracks patched over with tar aren’t random, but often follow seams and joints in the roadbed beneath the pavement. Repaired potholes, repaving projects, and utility work can result in patches of darker asphalt or fresh concrete. Try Google Street View so you can study roads without becoming a road hazard yourself.

The photo of the well-worn road above comes from *Model Railroader*’s Bay Junction project layout. If you want to read more about how I modeled this road (and the rest of the town), check out our May 2011 issue.



We tend not to pay much attention to ordinary things we see every day, like a city street. If you did, you’d notice faded colors, streaks of grime, patches, potholes, and more, like those depicted on this HO scale street through *Model Railroader*’s HO scale Bay Junction. Steven Otte photo

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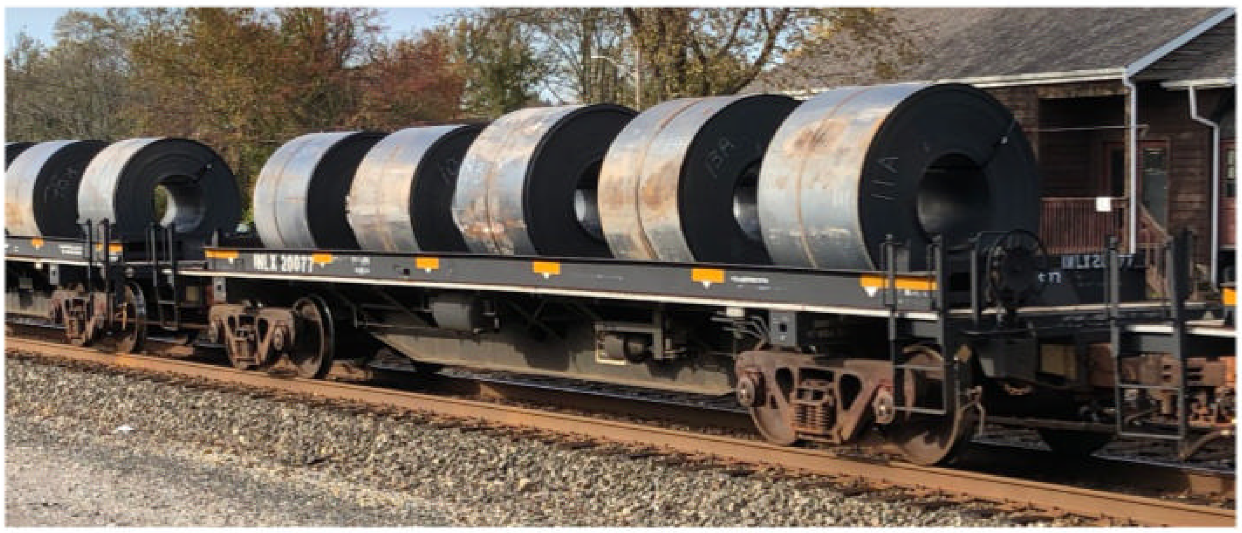
Q I was wondering, what are the rules for hauling steel beams, sheet metal, and rolled steel? With steel beams, do they go by the weight of the beam or the thickness? What about sheet metal loads; do they go by thickness or quantity of the load? With rolled steel, how wide is the roll? What is the thickness and number of feet?

James Shepard

A Weight, rather than dimensions, is the governing factor when loading a freight car. Steel is a very dense material, so it doesn't take a lot to reach the load limit of a typical freight car.

Frequent *Model Railroader* contributor M.R. Snell wrote an article for our March 2016 issue, "Model realistic stacked steel plates." This article includes a link to an online calculator for figuring how much a particular volume of steel weighs (www.calculatoredge.com/matweight/material%20wt.htm). The load he was modeling reached the 37-ton weight limit of the flatcar he was using for his project in only four slabs!



A coil steel car moves through Chesterton, Ind., in an eastbound Norfolk Southern train on Nov. 7, 2021. Car weight capacity governs how steel is moved on the railroads. Thomas E. Hoffman photo

This will be true no matter whether the steel you're moving is in the form of slabs, I-beams, ingots, or sheet-metal coils, like the ones on the Norfolk Southern train in the photo above. The car will reach its weight limit long before the car fills up, so your load will look realistic if you only use a few pieces.

As for what sizes steel lading comes in, that's infinitely variable, depending on the demands of the customer. Sheet steel can be thick or thin, slabs can be narrow or wide, and extruded shapes like pipes, rods, angles, or I-beams can be long or short. Use what looks right for the car you're loading. And don't forget the banding, bracing, and blocking to keep that load in check. You don't want it sliding around inside the car when the train slows down or rounds a bend. MR

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TRIX

The Union Pacific Railroad rolled out the biggest restoration of 2019, the complete overhaul of the largest steam locomotive in the world – the Big Boy, road number 4014.

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Denver & Rio Grande Western 2-8-2 No. 453 emerges from a stand of fir trees. Kim Nipkow shares how he made the HO scale trees using bamboo skewers, copper wire, and easy-to-find scenery materials. Photos by the author

How to model fir trees

With few exceptions, model railroads need trees. There are plenty of off-the-shelf options, from generic deciduous and evergreen trees to specific species, such as apple, oak, and weeping willows, among others. Though convenient, commercial trees can be expensive, especially if you have a large model railroad to populate. In addition, the realism of the trees is all over the map. Some are rather basic in appearance, while others are highly detailed. In a few cases, off-the-shelf trees are hand-crafted in small batches.

Though scratchbuilding trees is a bit more time consuming, you can make them in the sizes, shapes, colors, and quantities that you need. That's exactly what I did when I needed fir trees for an HO scale diorama.

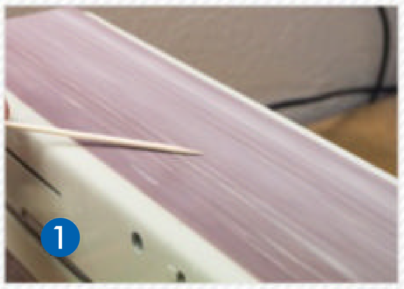
The materials list for my scratchbuilt fir trees is short: bamboo skewers, copper wire, 6mm static grass, flocking material, spray adhesive, and spray paint. Each fir tree takes 20 minutes to build. If you need a bunch of them, I'd recommend setting up an assembly line to help expedite the process.

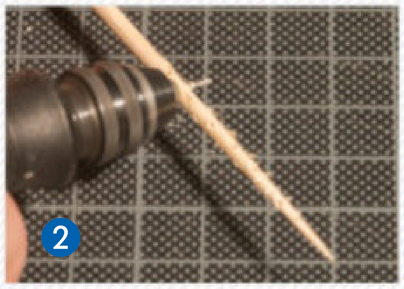
Even if your layout doesn't call for fir trees, you can adapt the materials and methods shown here to re-create the trees you need. The bamboo skewers make the trees easy to plant using an awl and white glue in pretty much any layout surface.

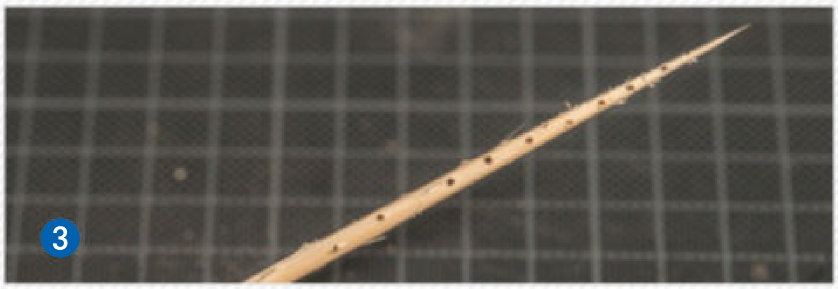
If you want to give the scenery on your model railroad a personal touch, consider scratchbuilding fir trees. There's a pretty good chance you have most, if not all, of the materials to build the trees in your house already. So round up the supplies and get started.

Kim Nipkow lives in Switzerland. He's been contributing articles to Model Railroader *since 2012. Has last story, "How to populate passenger cars," was in the September 2020 issue.*

STEP 1 SHAPING THE TRUNK





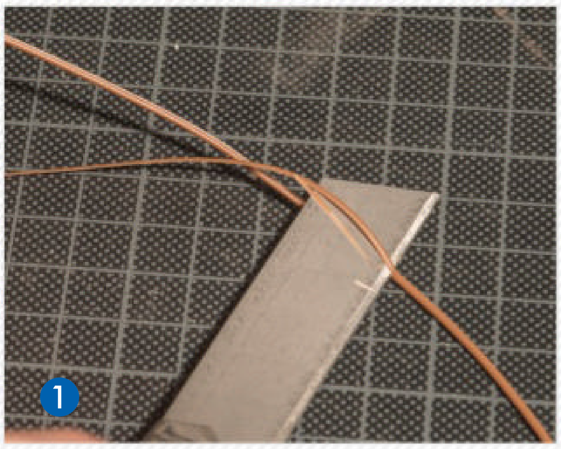


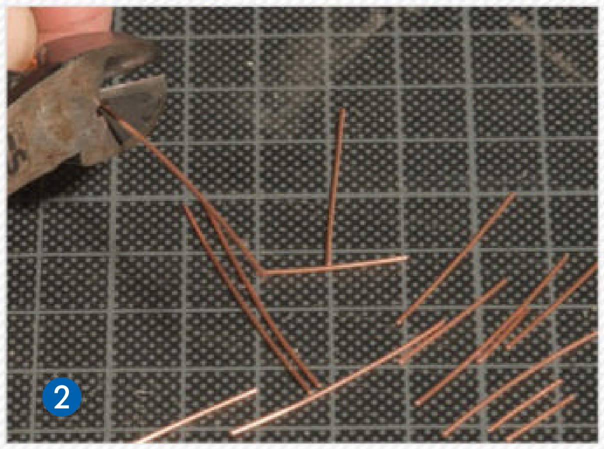
I used bamboo kebab skewers for the trunks. I started by sanding one end to a pointy tip. If you plan on making multiple trees, a belt sander like that shown in ① greatly expedites the task.

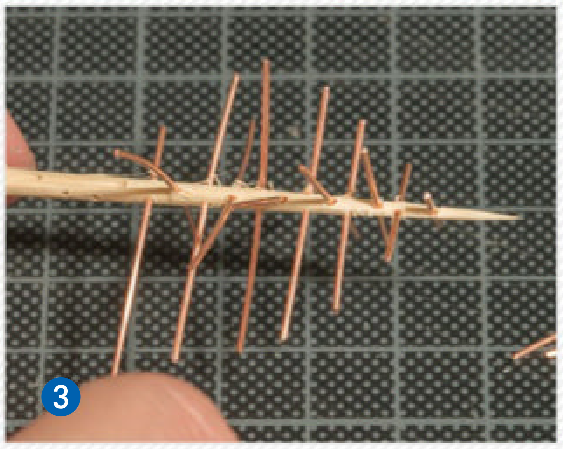
Next, I used a motor tool to drill holes through the skewers ②. The bit should be the same diameter as the wire used for the armatures (more on that in the next step). I drilled the holes in an irregular pattern ③.

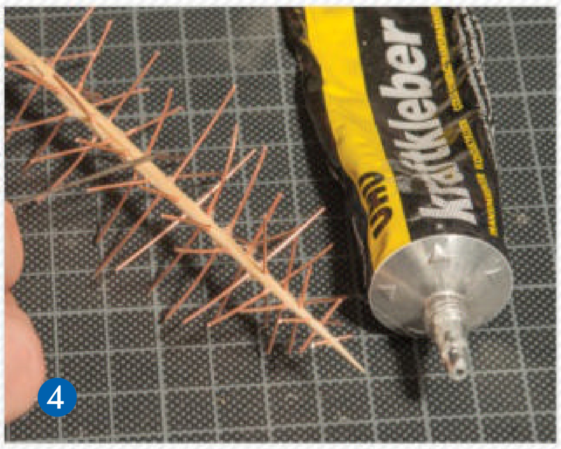
A decent size for HO scale fir trees is somewhere between 6 and 8 inches. The tree I made for this article is around 4 inches, representing a younger fir.

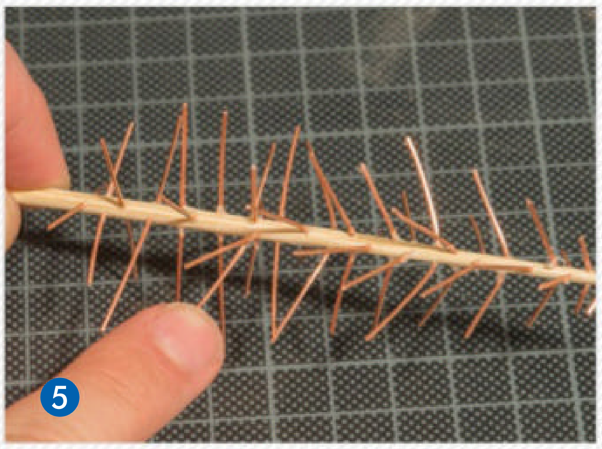
STEP 2 WIRE BRANCHES

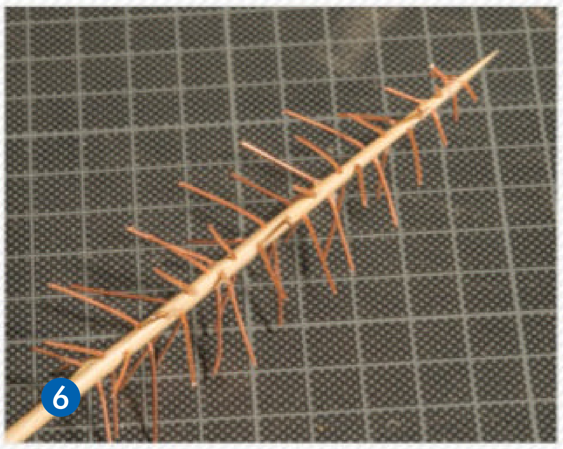










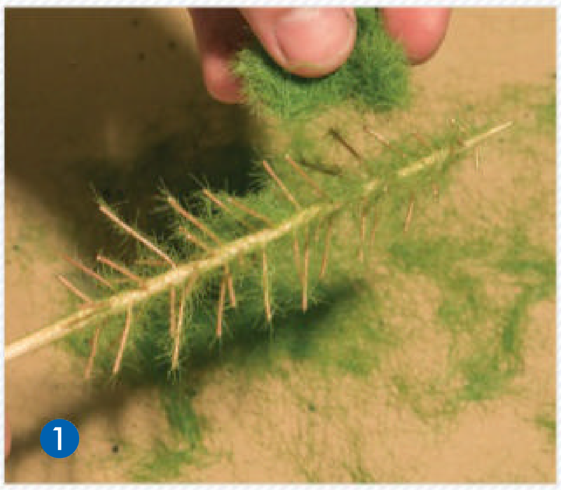


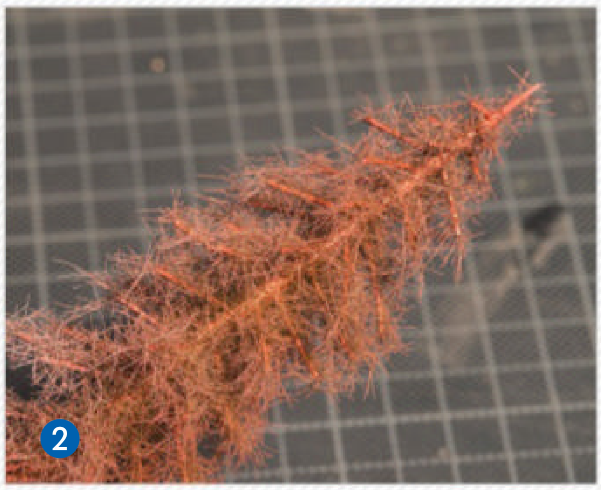
I made the branches for the trees using copper wire. First, I stripped the insulation with a utility knife ①.

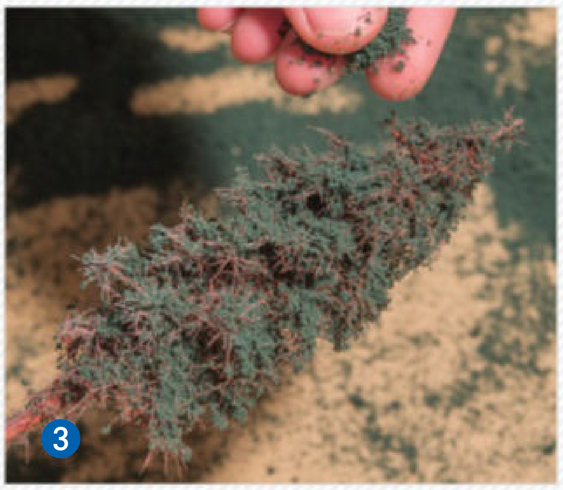
Then I cut the copper into lengths between ¼" and 1¾" long with wire cutters ②. Once I'd cut enough wire for a tree, I began installing the branches, working from the top down ③. By using the appropriately sized bit, the wire should stay in the holes. To make sure the wires would stay in place, I used a pin to apply cyanoacrylate adhesive (CA, or super glue) on both sides of each hole ④.

After the glue had cured, I used my finger to bend the wires down slightly ⑤. The finished tree "blank" is shown in ⑥.

STEP 3 FINISHING TOUCHES







Wood and wires alone don't make very convincing fir trees. To scenic the trees I used a multi-step process. First, I applied spray adhesive to the blank. Then I sprinkled 6mm static grass fibers over the wire branches ①.

The tree looked a bit spare with just one application of static grass fibers. I applied a second coat of spray adhesive and added more fibers.

Next, I spray-painted the tree a reddish-brown color ②. Do this in a well-ventilated area and wear safety gear.

After the paint had dried, I applied more spray adhesive. Then I added Scenic Express Dark Forest Green Fine over the branches ③. I secured the flocking material with a final, light coat of spray adhesive.

With that, the trees were ready to plant. Each fir takes about 20 minutes to make. Though not as fast as using off-the-shelf trees, I can make the firs to the sizes and shapes that I need. Plus, I have the satisfaction of knowing I made them myself.

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Steve Miazga returned this unreliable vintage diesel to service on his N scale Soo Line-inspired model railroad by replacing its worn brass wheels with new blackened-metal ones.

ONE GOOD TURN LEADS TO ANOTHER

Replace worn wheels to bring your old N scale locomotives back to life

By Steve Miazga • Photos by the author

My Missabe Junction Ry. (MJR) models the Soo Line's former Lake States Division in Northern Wisconsin from 1960 to 1990. I host operating sessions once a month. The train consists are led by an array of motive power from the Soo's maroon-and-gold scheme, the new Soo, the transition to the Wisconsin Central, and finally the Canadian National.

Guest operators would frequently ask why I didn't operate with an all-Soo lineup. The answer was simple: I didn't have enough reliable motive power. The majority of my older locomotives that I'd custom-painted to match the prototype were unreliable. I needed to improve their operating to match their looks.

I think all of us get a little lax in our locomotive maintenance sometimes. We clean the wheels and clean our track. I typically use denatured alcohol for these tasks, but that wasn't doing the trick on the MJR. I needed to give the inner mechanisms of all the older locomotives a good cleaning.

The process involved removing all prior lubricants from the drive train and the truck gear boxes. I use a Microbrush and denatured alcohol to clean the truck gears. Once all of that was completed, I placed one drop of LaBelle No. 108 synthetic lubricant in each drive bearing and one drop on each side of the motor shaft. Nothing else. The results were phenomenal – quiet, smooth running.

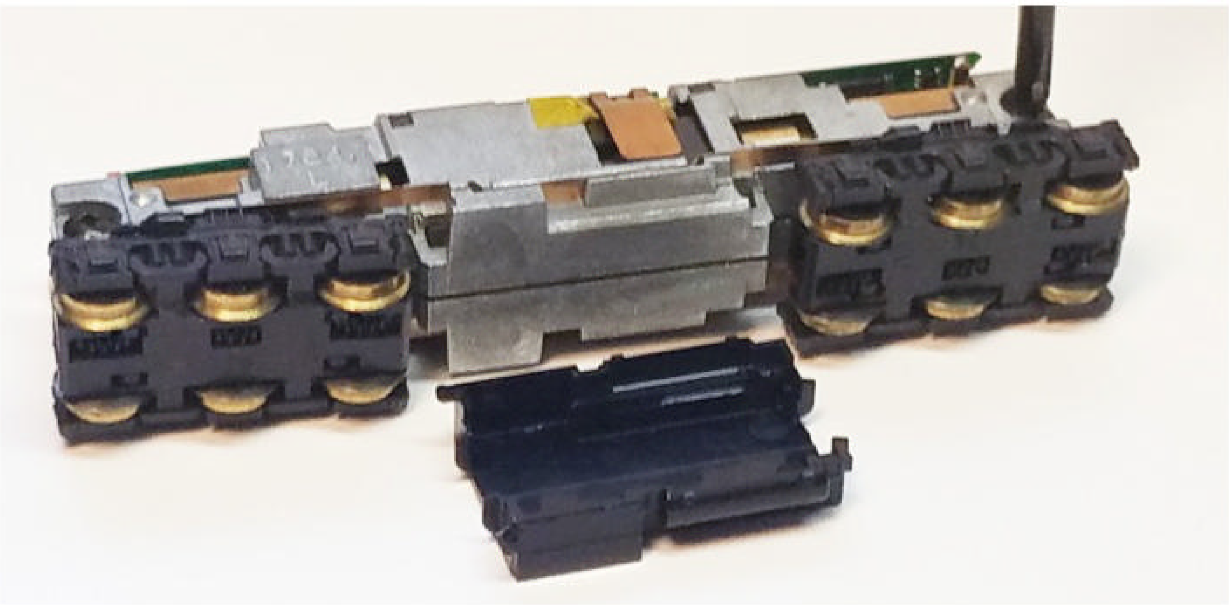
But even after cleaning, the older locomotives would still become sluggish after a lap or two. I would clean the wheels again and find a lot of black gunk on the wheels. Upon closer inspection of the wheels, I found the nickel-silver tread plating had worn off, leaving only brass (and we all know why the brass track era ended).

The operating pattern continued: run a few laps, then clean the wheels. The worn wheels were preventing me from getting my older power running well. I started researching replacement parts.

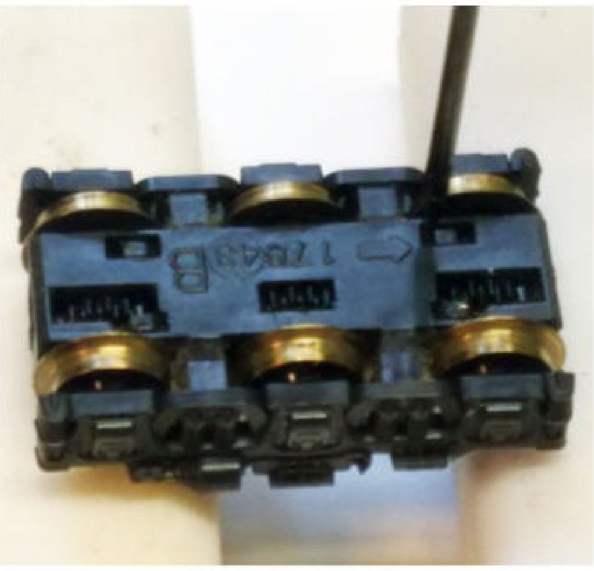
A simple replacement

Atlas Model Railroad Co. was my first call, since most of my locomotives are from Atlas. The first thought was to get replacement trucks. This turned out to be prohibitively expensive, and in many cases the parts were no longer available anyway. Most of the locomotives were produced in the 1990s.

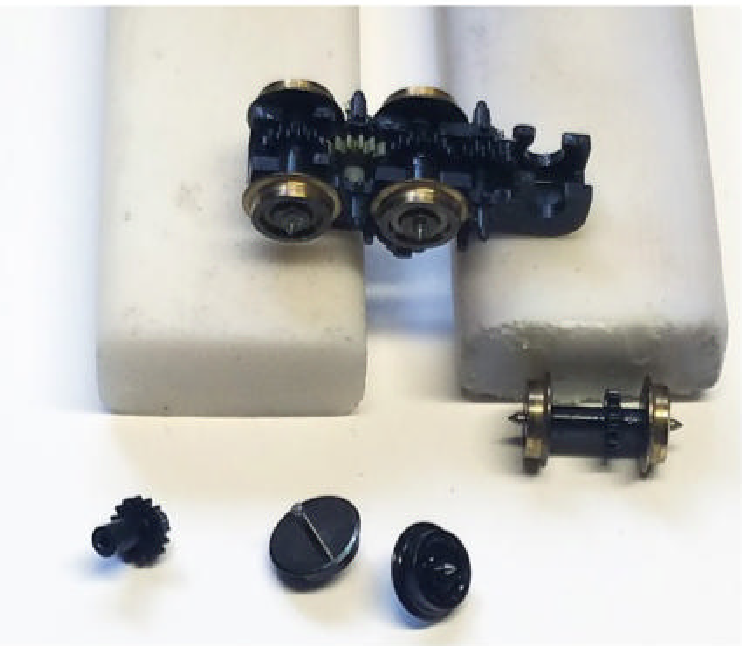
After some great discussions with their parts folks, I went to Plan B



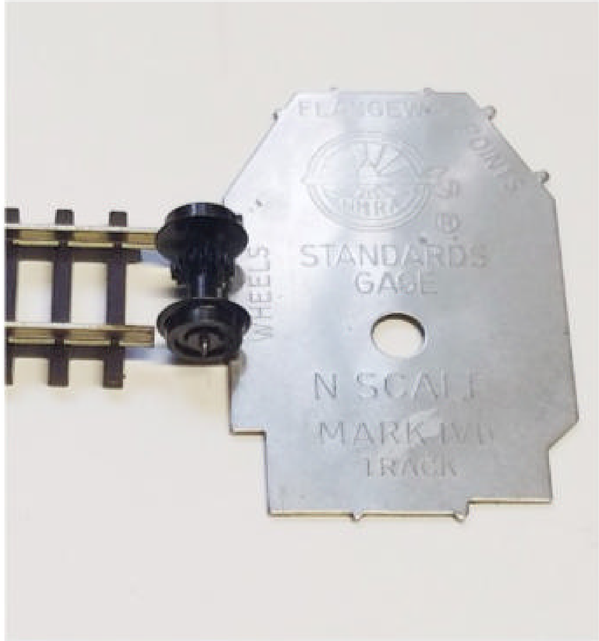
① **Releasing the trucks.** The locomotive's trucks are held in place between the halves of the die-cast-metal frame. Loosening two screws allows the trucks to be slid out of the frame.



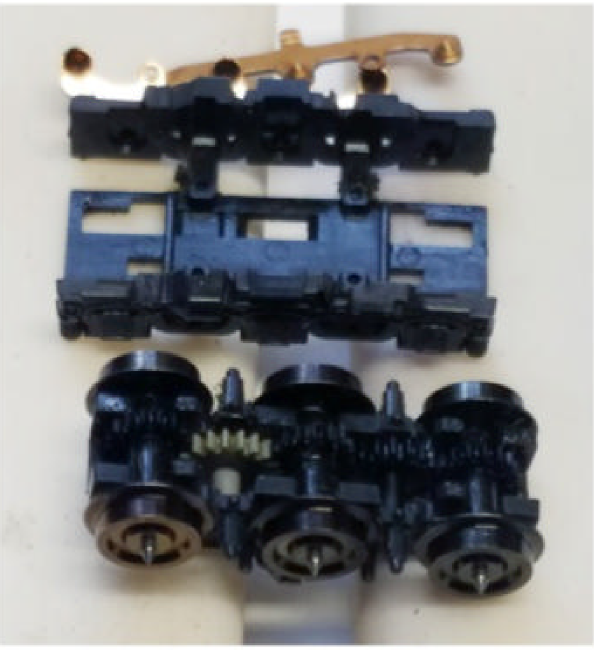
② **Easy does it.** To remove the trucks' axle covers, use a flat-bladed jeweler's screwdriver to depress the tabs in these two notches.



③ **Replacing the wheels.** The disassembled truck is ready to have its wheels replaced. Steve supports the truck on two pencil erasers to protect the gear towers.



④ **Checking gauge.** The wheels are press-fit into the plastic axle. After inserting the new wheels, check their gauge with a standards gauge and a piece of track.



⑤ **Reassmbling the trucks.** With the axles upgraded with new, blackened-metal wheels, the truck is ready for reassembly.

– replace the wheelsets only. I hoped that I could perform a direct one-for-one replacement of the wheelsets in each truck. The Kato-manufactured locomotives used part no. 450304, and the ones that were manufactured in China used part no. 490304.

The replacement process was pretty straightforward. Loosen and remove the trucks from the locomotive, open up the trucks, and switch out the wheelsets. After a quick wheel cleaning to remove any oxidation the new wheels had developed in storage, the locomotives went on the track, and guess what – they ran just like right out of the box new! So we were off to the races with an operating scheme that would feature all Soo power.

A more involved repair

There was one problem, though. I had an Alco RS2 and RSC2 that I really wanted to get running. These were manufactured by Kato for Atlas. But I was at a dead end, since no replacement wheelsets for these models were offered. So I dug a little deeper.

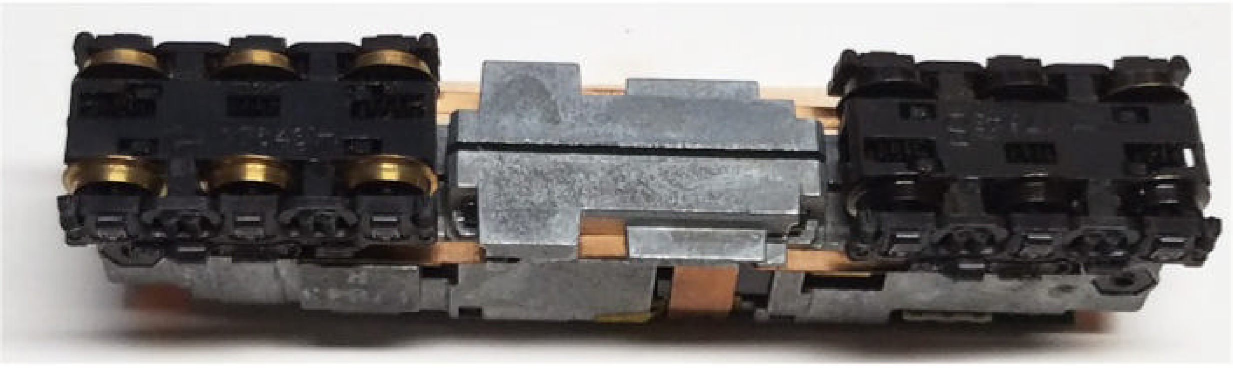
I had earlier replaced the wheelsets on a Kato-produced GP35 and still had the old, worn wheelsets. I put them on the workbench and found out that the geared axle and the wheels are separate, interchangeable components. The wheels are press-fit on the axle. After realizing this, I again called the parts folks at Atlas. Could I order the Kato GP35 wheelsets and do the switch? It made sense to them, so away I went with another parts order.

I also ordered more wheelsets for the China-manufactured Atlas locomotives that at least had a standard wheel, so I could do some updates on my other SD locomotives. Here's what you need to do to switch out the wheels on the older locomotives when you don't have the exact part.

Removing the trucks

Carefully remove the shell from the locomotive. With the frame exposed, remove the fuel tank shroud from between the trucks, then loosen the two screws that secure the frame pieces ①. You should now be able to gently wiggle the first truck from the frame. Don't force removing the truck. If it's still tight, use a small flat-blade screwdriver to spread the two halves of the frame to loosen the truck from the chassis. I recommend doing one truck at a time. Make sure you keep track of the truck direction as it relates to the frame; some are not symmetrical.

With the first truck removed, separate the truck frame from the gear train. On the underside of the truck there are two small tabs, each opposite the exposed gear opening. Use a flat-bladed jeweler's screwdriver to release these tabs so that you can separate the frame from the wheelsets and gears ②. The electrical pick-ups will drop off of the gear box; set them aside for now. You'll want to clean them before reassembly.



⑥ **Before and after.** The new blackened-metal wheels are on the right, compared to the original brass wheels on the left.

Replacing the wheels

In some cases, the gearing on the replacement axle may be the same as your original. If so, one-for-one replacement of the wheelset will save you a lot of time. If not, remove the new replacement wheels from their geared axles by twisting and pulling gently ③. They should release easily. A needlenose plier is helpful to hold the axle.

Remove the first old wheelset from the truck and switch the old wheels with the new ones. There's a slight tolerance in the wheel spacing to allow you to adjust the gauge if necessary. Use a National Model Railroad Association (NMRA) Standards Gauge to check the wheel spacing on the axle ④. I also test it on a scrap piece of N scale track. Once the new wheels are on the axle and in gauge, reinstall the wheelset and move on to the others.

Be careful with the truck reassembly. Make sure that the pick-ups are properly aligned when you reassemble the trucks ⑤. If everything is lined up right, the trucks will go back together easily. If you have to force it, something is out of line. Retrace your steps until you have it right.

Reinsert the trucks, replace the fuel tank shroud, and tighten the screws that secure the frame halves to secure the trucks ⑥.

Testing

Once both trucks are upgraded, test the locomotive on the layout to make sure that the gauge does not need adjusting. Every layout has a location where derailments are common for whatever reason. Run your locomotive through these track sections to make sure all is well. If adjustments are needed, you'll have to open up the truck and adjust the problematic axle.

Once satisfied with the operation, replace the shell and smile as you enjoy the good-as-new operation of your locomotive. MR

Steve Miazga lives in Pewaukee, Wis., in the Milwaukee area, with his wife, Jenny. They have three sons. His N scale Missabe Junction Ry. was featured in our September 2018 issue.

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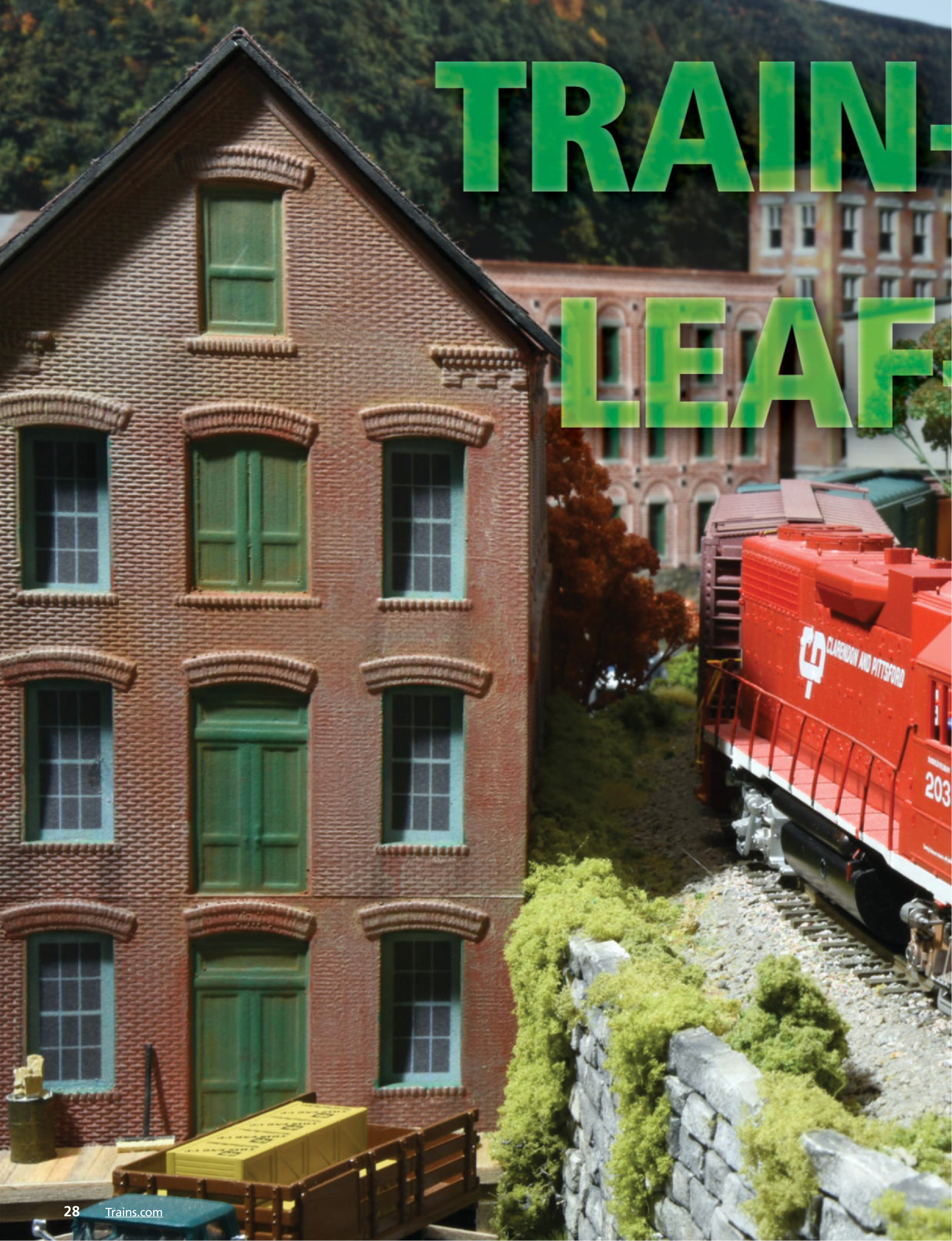
CLARENDON AND PITTSFORD
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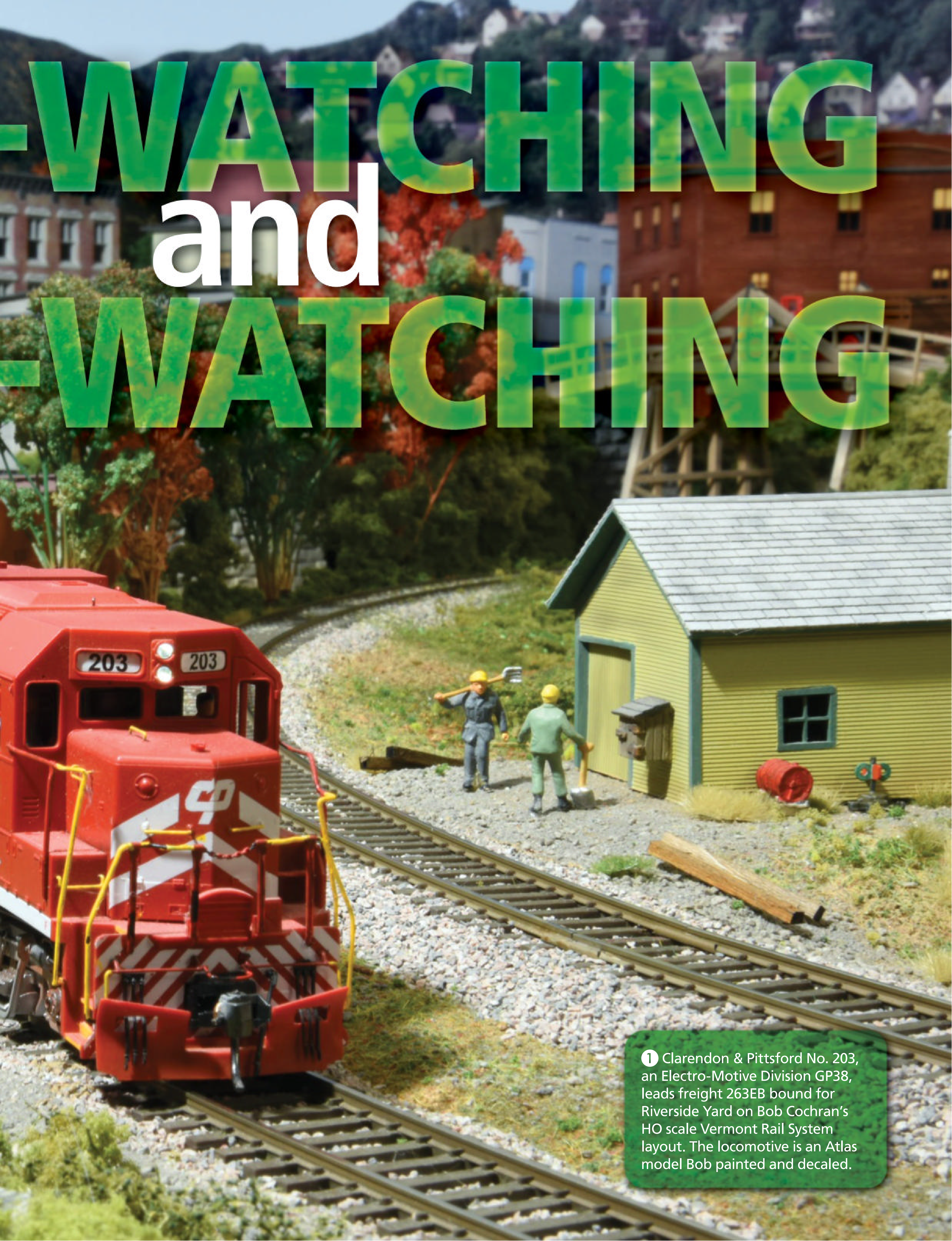
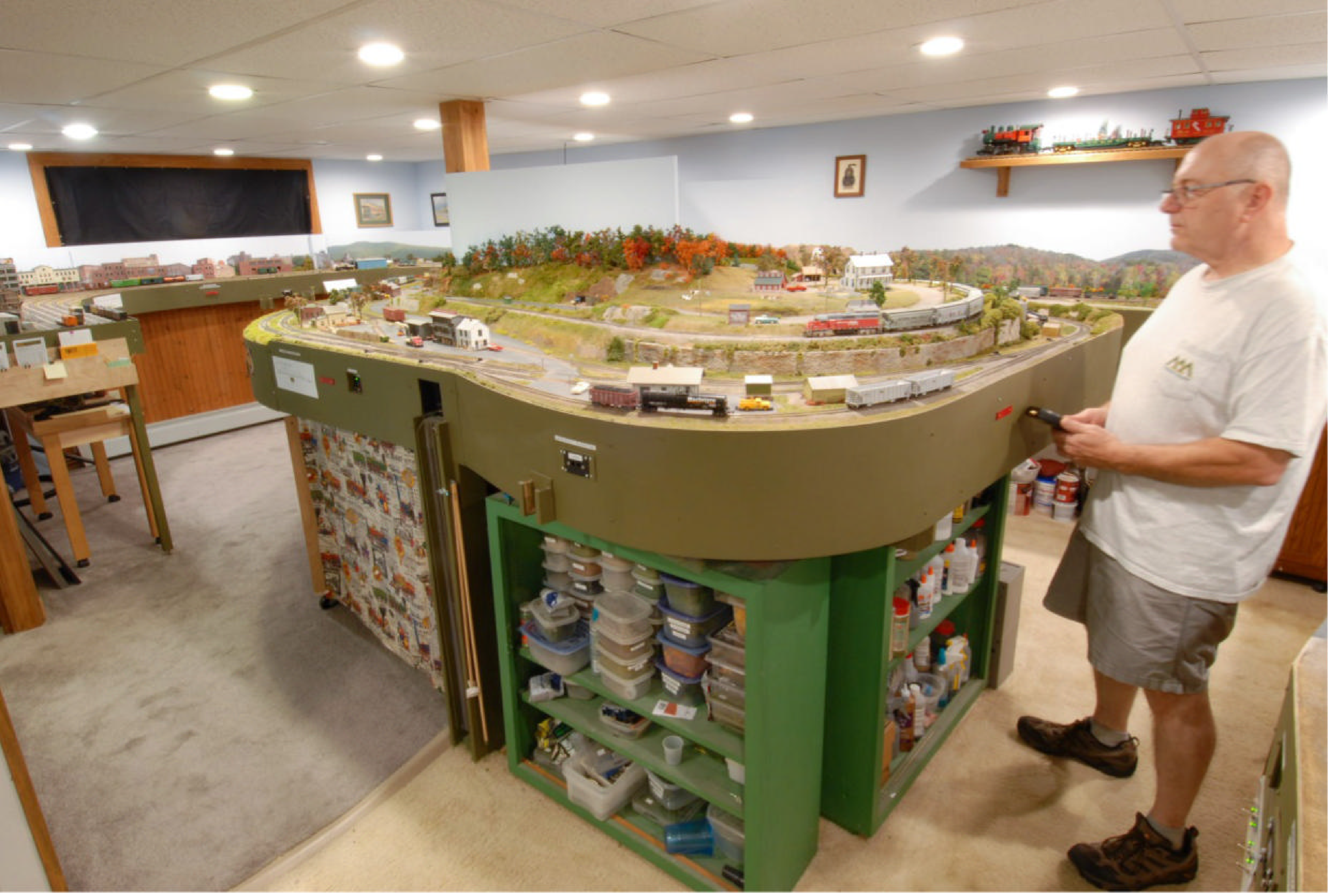
-WATCHING



① Clarendon & Pittsford No. 203, an Electro-Motive Division GP38, leads freight 263EB bound for Riverside Yard on Bob Cochran's HO scale Vermont Rail System layout. The locomotive is an Atlas model Bob painted and decaled.



② Bob operates on his layout. In the center is Ludlow Station and its team track, and to the left is Tinny Lumberyard. The farmhouse and barn on the hill are at the summit of the main line to Rutland.

Bob Cochran based his HO scale empire on the railroads of his Vermont childhood

By Bob Cochran • Photos by Lou Sassi

My Vermont Rail System is loosely based on the former Rutland RR Bellows Falls Subdivision. Leaving Bellows Falls, Vt., the trackage follows the Connecticut River for few miles. It then turns northwest and follows the Williams River through several small villages and through the Green Mountains into Rutland, Vt.

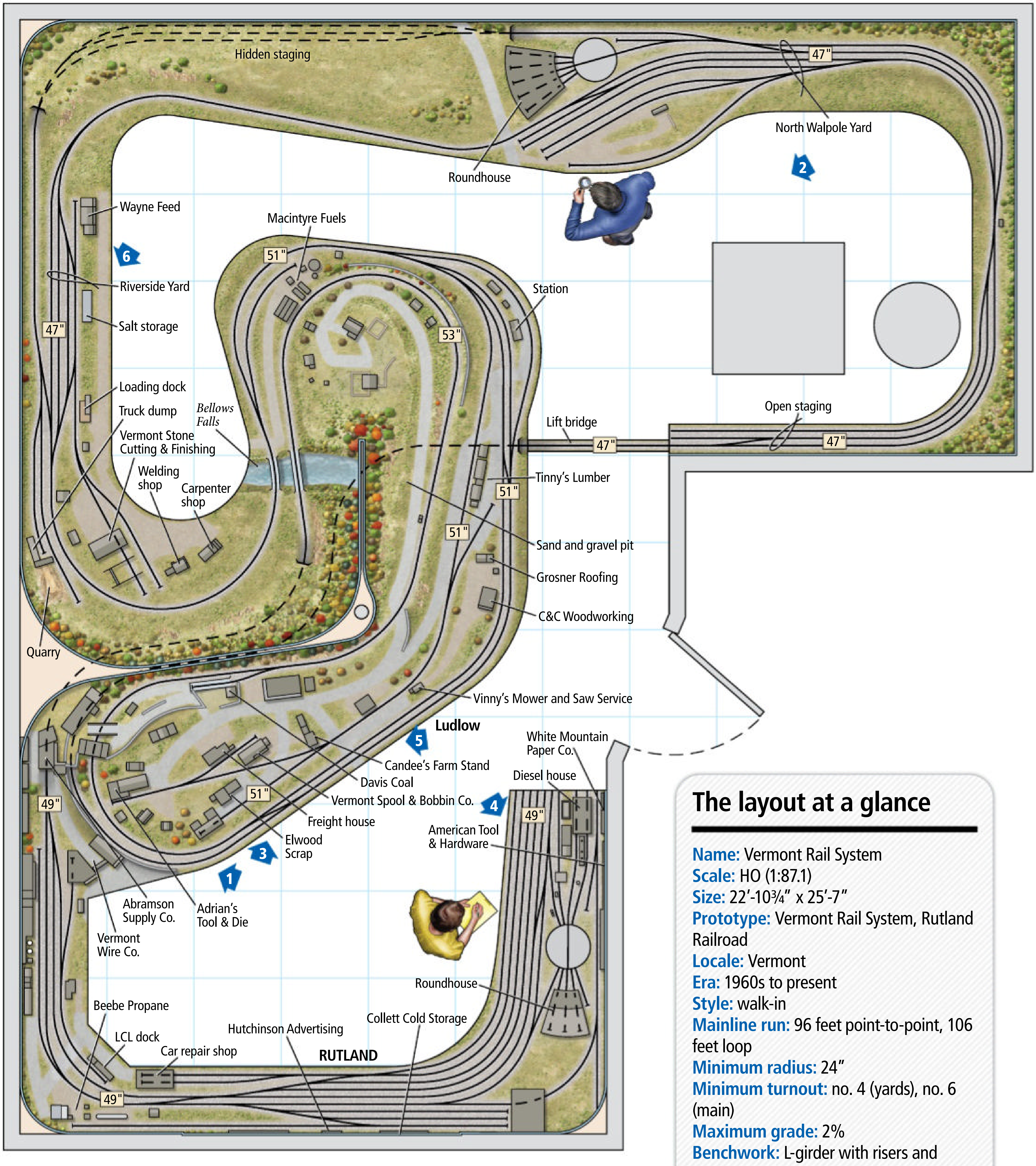
After the demise of the Rutland, the line was bought by the State of Vermont, which leased the trackage from Burlington to North Bennington to Vermont Railway. The tracks from Rutland to Bellows Falls were leased to the Green Mountain Railroad in 1965. In 1997, the Green Mountain was purchased by the Vermont Railway, which now operates over all former Rutland tracks. This is now known as the Vermont Rail System.

When I was growing up, there were three railroads in Bellows Falls: the Rutland, Central Vermont, and Boston & Maine. I got to see the last of the steam locomotives, as well as first-generation diesels. When I was a Cub Scout, I sold greeting cards for points. One of the items you could get with your points was an HO scale Tyco train set. That's how I got my start in the hobby. My first layout was a 4 x 6 plan from *Model Railroader*'s book *Railroads You Can Build*.

During my 21½-year career in the United States Air Force, I maintained a casual interest in model railroading. During that time, I started another layout, but because of my having to move, it never got completed.

After retiring from the military and building a new house, I was ready to start again. Two articles in *Model Railroader* influenced my design. North Walpole Yard is from "Green Mountain's North Walpole Yard" in December 1987, with some changes. "The Green Mountain Railroad" in September 1989 gave me ideas for the rest of my design, including easily accessible turnouts, continuous running, and wide aisles for operators.

I used a program called Cadrail from Sandia Software to draw my track plan. With this program, I was able to make full-size printouts of turnout locations


Hidden staging
47"
North Walpole Yard
Roundhouse
2
Wayne Feed
Macintyre Fuels
51"
6
Riverside Yard
Station
47"
Salt storage
53"
Loading dock
Truck dump
Bellows Falls
Vermont Stone Cutting & Finishing
Open staging
Lift bridge
47"
47"
Welding shop
Carpenter shop
Tinny's Lumber
51"
51"
Sand and gravel pit
Grosner Roofing
C&C Woodworking
Quarry
Vinny's Mower and Saw Service
Ludlow
5
White Mountain Paper Co.
Candee's Farm Stand
Diesel house
Davis Coal
49"
51"
Vermont Spool & Bobbin Co.
4
49"
Freight house
Elwood Scrap
American Tool & Hardware
3
1
Abramson Supply Co.
Adrian's Tool & Die
Vermont Wire Co.
Roundhouse
Beebe Propane
Collett Cold Storage
LCL dock
Hutchinson Advertising
Car repair shop
RUTLAND
49"

Vermont Rail System

HO scale (1:87.1)
Room size: 22'-10¾" x 25'-7"
Scale of plan: 5⁄16" = 1'-0", 24" grid
Numbered arrows indicate photo locations
Illustration by Kellie Jaeger

Find more plans online in the Trains.com Track Plan Database.

The layout at a glance

Name: Vermont Rail System
Scale: HO (1:87.1)
Size: 22'-10¾" x 25'-7"
Prototype: Vermont Rail System, Rutland Railroad
Locale: Vermont
Era: 1960s to present
Style: walk-in
Mainline run: 96 feet point-to-point, 106 feet loop
Minimum radius: 24"
Minimum turnout: no. 4 (yards), no. 6 (main)
Maximum grade: 2%
Benchwork: L-girder with risers and open-grid
Height: 47" to 55"
Roadbed: Homasote and Woodland Scenics Foam-Bed
Track: Atlas Code 83 flextrack with Atlas and Walthers turnouts
Scenery: cardboard web and foam board covered with plaster cloth
Backdrop: photos printed on cardstock
Control: NCE Power Pro DCC

ELWOOD
SCRAP IRON & STEEL
Vermont Spool and Bobbin Manufactory
N Y C 6034

④ Illinois Central 4-8-2 No. 2819, on loan for the fall foliage excursions, fuels up at Rutland Yard after its last trip of the day. The coaling tower was scratchbuilt from scale basswood.

and curves with easements. After the track plan was completed, I designed the benchwork to fit the plan.

Building the Vermont Rail System

I started with finishing the train room. First I painted all the walls sky blue, then put in a drop ceiling with fluorescent lights and carpeting. Recently I replaced the fluorescents with recessed warm white LED lights. I also installed power outlets controlled by a lighted master wall switch. This ensures that I remember to turn off all layout power when I leave.

The layout benchwork is open-grid in some areas and L-girder with 1 x 4 joists and risers in the rest. Using the full-size track templates I printed out from Cadrail, I laid out the curves and turnout locations on ½" birch plywood and cut them out. I ripped the straight sections on a table saw, then spliced everything together.

A mixture of Homasote and foam Woodland Scenics Track-Bed is used as roadbed. The track is Atlas code 83 flextrack with Atlas and Walthers code 83 turnouts. I had to shim underneath the Walthers turnouts with .020" styrene because of a difference in the thickness of the ties between the two brands.

The layout is wired for Digital Command Control using NCE's Pro Cab system with radio throttles. Universal Throttle Panels are mounted in the fascia around the layout. There are six power districts, each of which is protected by a Power Shield. Each has a Mini Panel in the area it controls so I can conveniently turn off districts while I work on them without affecting the rest of the layout.

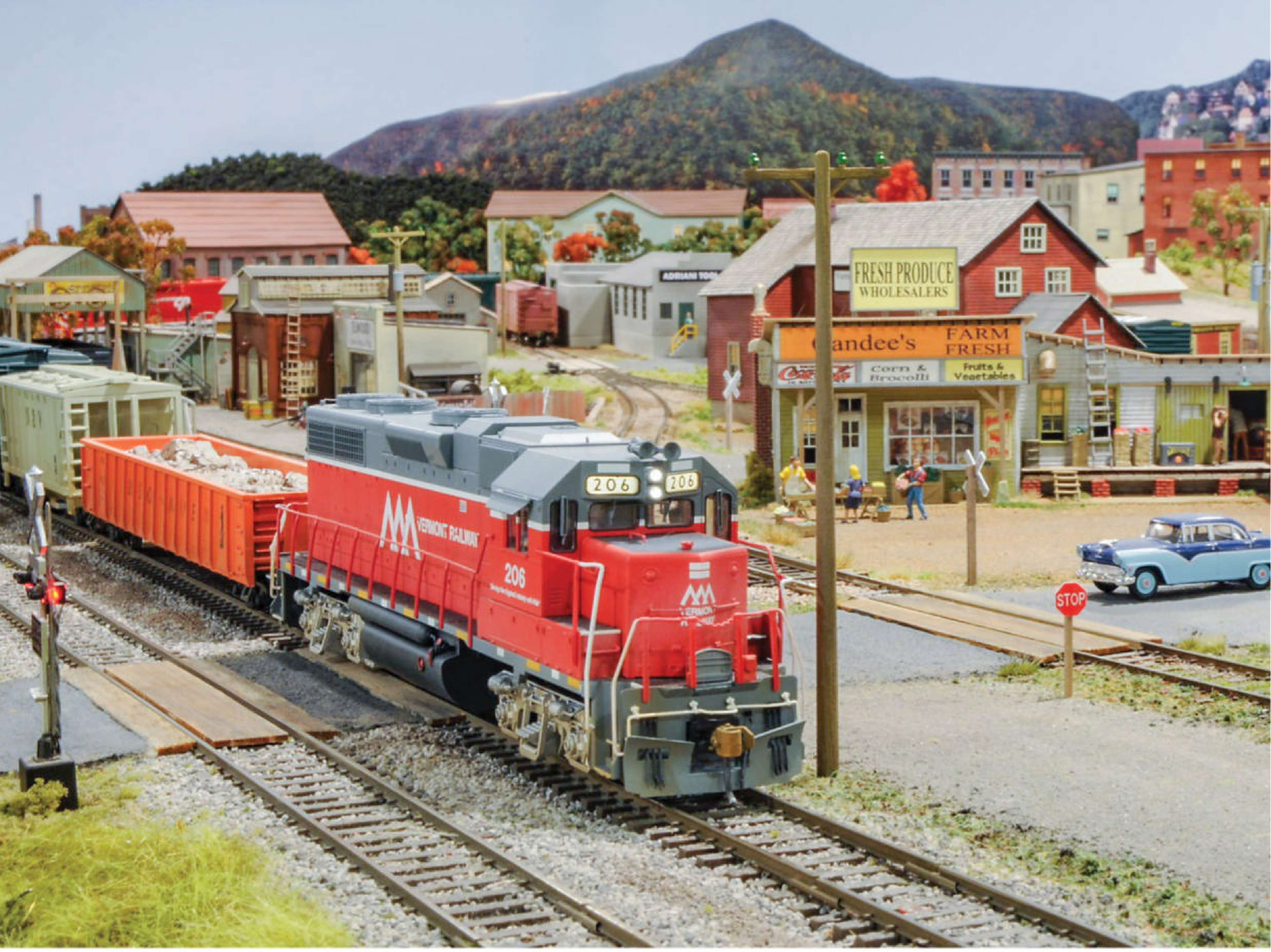
The main track power buses are 14 AWG stranded wire with 18 AWG and 22 AWG track feeders. The track feeders are located approximate every 3 to 4 feet.

North Walpole Yard uses Tortoise by Circuitron switch motors controlled with Wabbit stationary decoders by DCC Specialties. The turnouts can be lined by route control through the macro function or individually through the accessory function on a throttle. I have a separate booster for the Wabbits so if the yard shorts out, I can still control the turnouts. This also gives me a clean DCC signal on the power bus. Because of this, I've not had problems with the Wabbits losing their memory settings, as reported by other users.

All other turnouts are manually lined with Caboose Industries ground throws or with switch motors controlled by toggle switches on control panels with two-color LEDs to indicate their alignment. Other layout electronics include working crossing flashers.

All my locomotives are equipped with sound decoders from QSI, Soundtraxx, and ESU. I also have a Soundtraxx Soundcar for more realistic sounds.

③ The Ludlow switcher works the Elwood scrapyard, which was built from a Bar Mills craftsman kit. Vermont Spool & Bobbin Co. in the background was scratchbuilt from plans published in *Model Railroader*. The General Electric 45-tonner is a Bachmann model.



⑤ Vermont Railway No. 206 heads up a westbound freight, passing Candee's Farm Market. Bob named the Bar Mills structure after his grandfather, who was a produce farmer.

Meet Bob Cochran

Bob grew up watching trains on the main line of the Central Vermont and Boston & Maine railroads right across from his house in Bellows Falls, Vt. Bob retired after 21½ years of service in the United States Air Force. He and his wife, Kathy, have three grown children, Candee, Heather, and Daniel. Bob and Kathy now live in Seymour, Conn., and enjoy going to Vermont whenever possible.

Terrain and scenery

I model late summer to mid autumn because I like the fall colors that make for colorful scenery. It is also a challenge to blend all the colors together.

Most of my landforms are cardboard strip web or pink extruded-foam insulation board covered with plaster gauze, Sculptamold, or Ground Goop. I then paint the surface with earth-colored latex paint and use ground foam, real dirt and rocks, and ground-up dry leaves for ground cover.

Trees are mostly made from pepper grass and dried flower filler. I spray these with shades of rust, orange, yellow, red, and green paint, then tie them together in bunches with brown florist tape. I also use Woodland Scenics and Scenic Express ready-made trees. All paved roads are made from pre-mix concrete patch painted to look like asphalt.

I model water using Enviro-Tex Lite two-part epoxy. Before applying the epoxy, I painted the streambed with dark colors to simulate depth and add details such as rocks and small dams. After the water cured, I used Woodland Scenics Water Effects to create ripples, waterfalls, and rapids.

Structures

I've worked in various materials to build structures for the layout. They are a combination of wood, plastic kits, or resin. Because I enjoy working with wood, numerous structures have been scratchbuilt. The coaling tower at Rutland and the Queen Post Bridge over the mainline in Ludlow are two of these.

When I scratchbuild structures, I use a computer-aided design (CAD) program to lay them out and make mock-ups of them, complete with windows and

ORCHARD
Boy

doors. When I'm satisfied with the mock-up, I use the templates to cut out the walls, windows, and door openings from basswood and assemble.

The curved bridge over the water on the main line is made from a template using Cadrail. The main components are Central Valley girder sections cut to fit the curve, with spacers keeping the bridge width correct. I then installed wooden ties and hand-laid rail, which I later weathered.

The tunnel area coming out of Rutland Yard is based on the tunnel in Bellows Falls. One challenge was that I had to hide the main line going upgrade to get the correct look I wanted. To accomplish this I used a few peppergrass trees and some foliage clumps trackside. This creates just enough separation between the two areas.

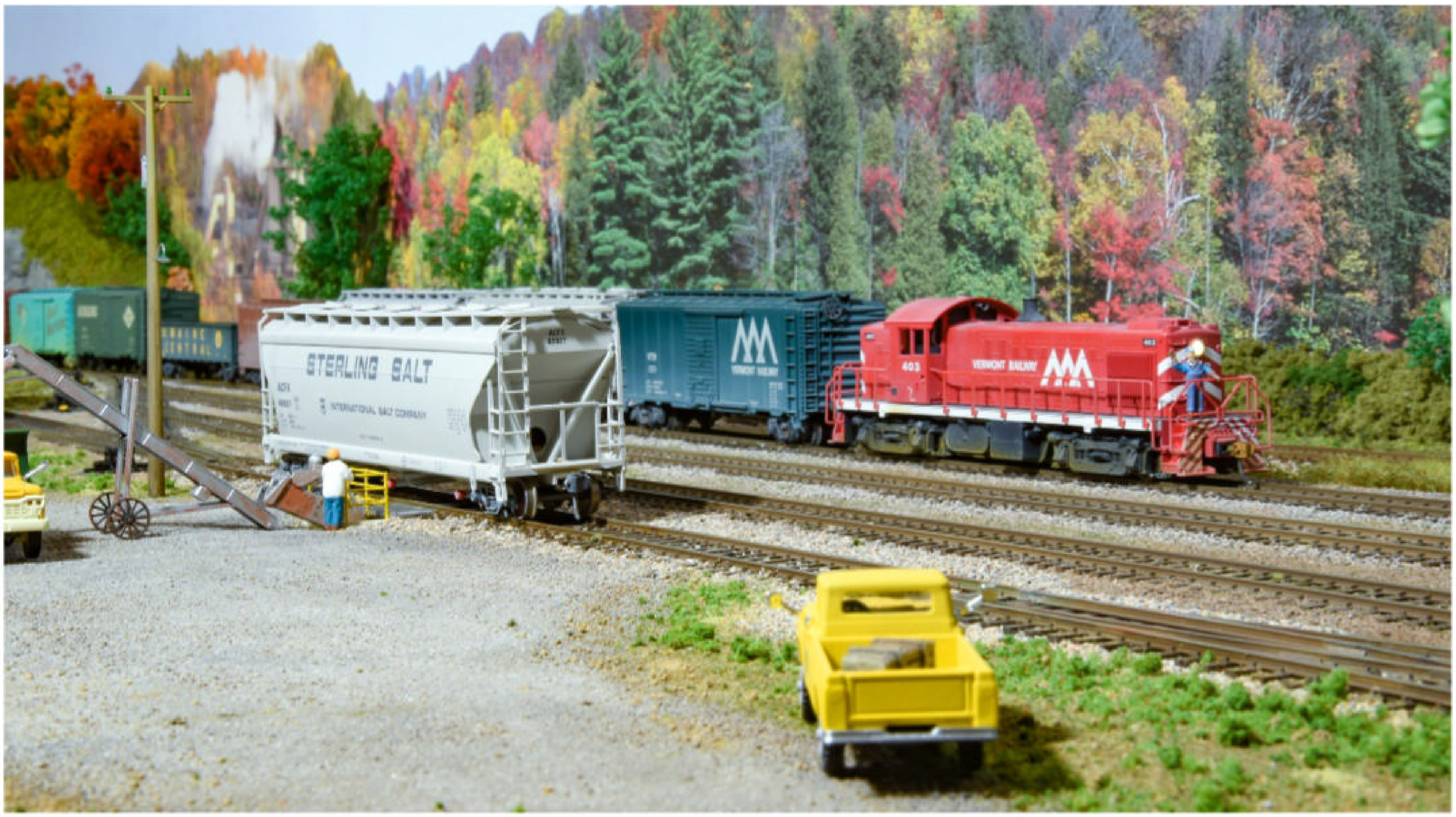
Operations

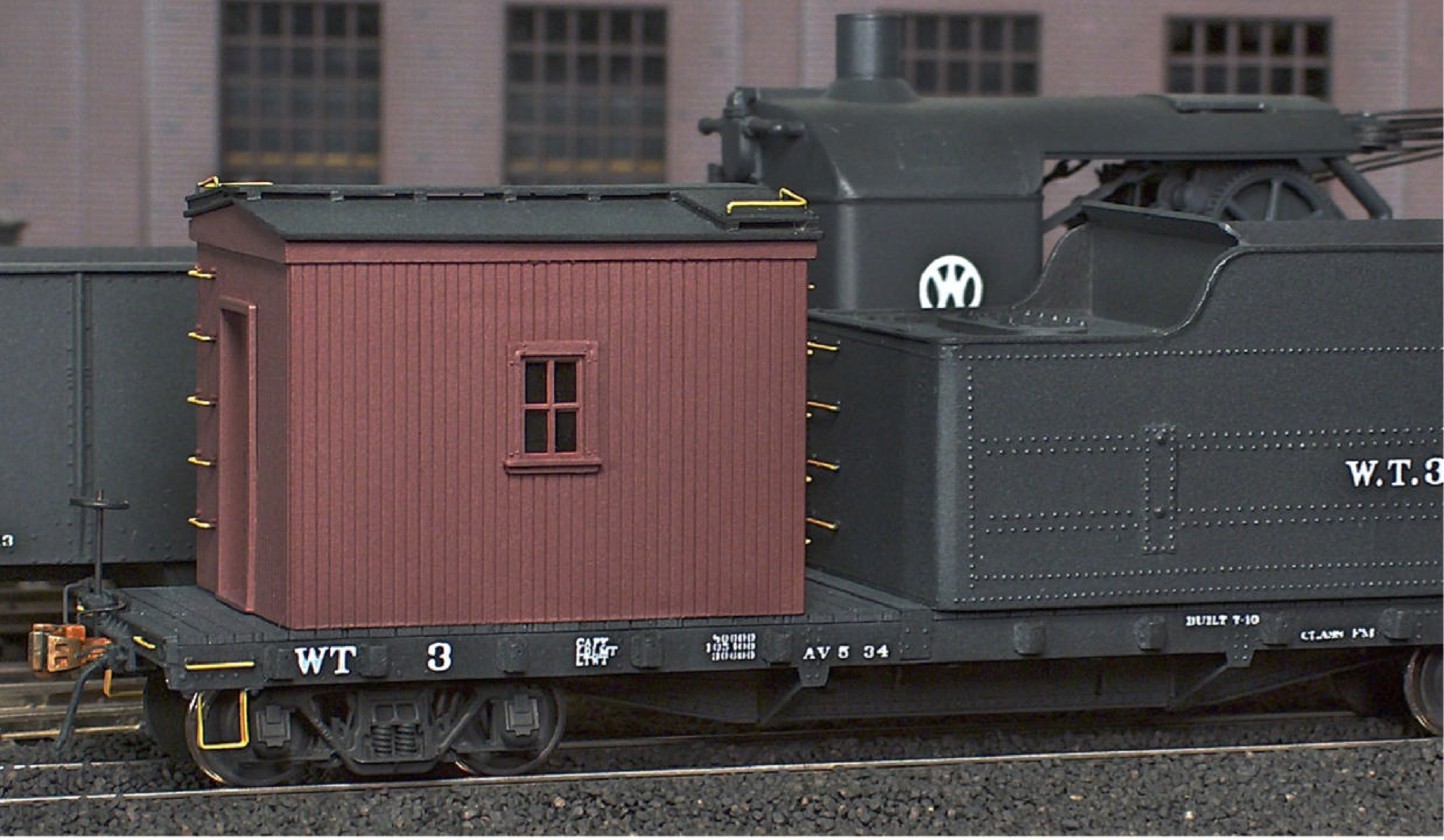
The layout supports four to eight operators. The sessions begin with freights 263EB, 263WB, and B&R setting out and picking up cars at North Walpole Yard. They return to Rutland at the same time the Bellows Falls and Rutland switchers are busy breaking up and assembling trains and serving local industries. The Ludlow switcher departs North Walpole and stops at Riverside Yard before going on to Ludlow to complete its switching chores. This job will return to North Walpole. Occasionally, a steam-powered fall foliage passenger excursion will run through the mix from North Walpole to Rutland.

Typical operating sessions last 1½ to 2 hours. Cars are routed using switch lists. On the back of the switch lists I have general instructions and duties for that crew to answer operators' questions.

Meeting bi-monthly, our round robin group "The Friday Knights of the Road" has provided many enjoyable evenings as well as inspiration and help in building the layout. I want to thank Bob Collett, John Grosner, John Elwood, John Adriani, Harry Bartocetti, Brian Hutchinson, Rich Abramson, and Vin Gallogly.

⑥ Vermont Railway No. 403, an Alco RS1, is westbound at Riverside Yard. Bob made the salt unloading pit with a Walthers coal loader and railings and other parts from his scrap box.





MODELING A STEAM CRANE'S WATER TENDER

Build a necessary piece of wreck train equipment

By Bob Karig • Photos by the author

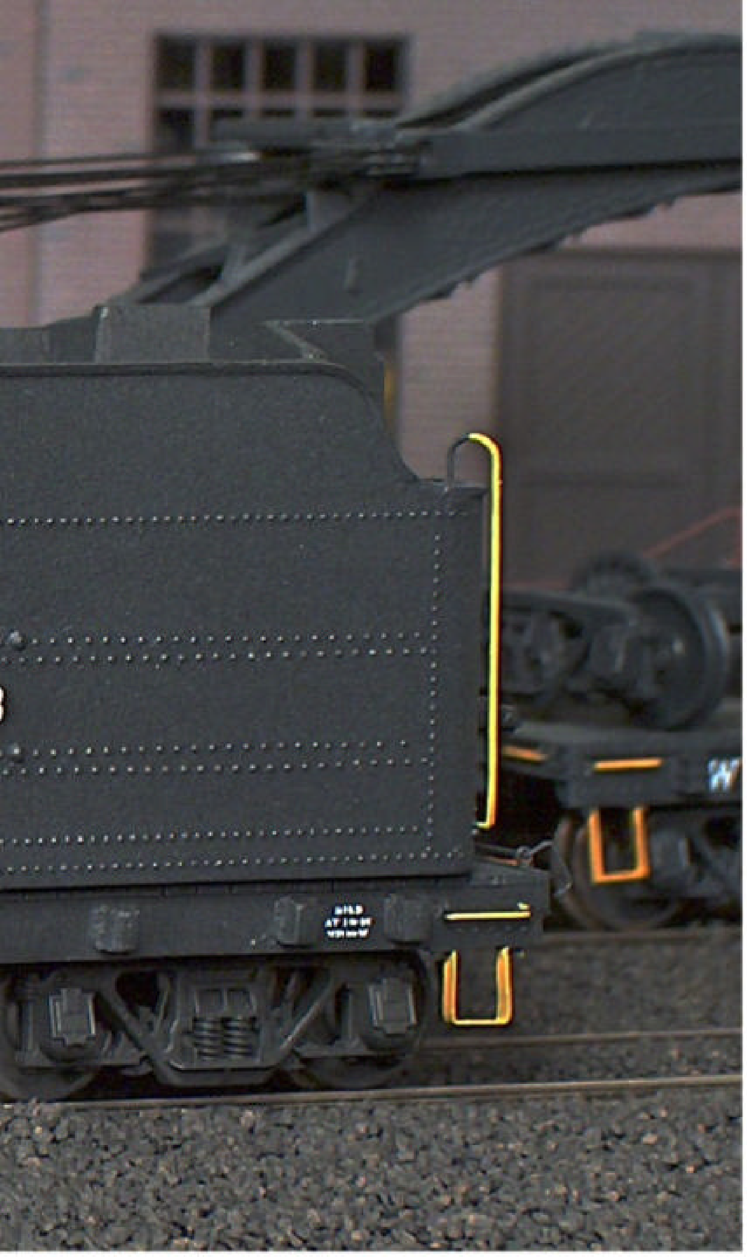
Steam-powered cranes have the same dietary needs as steam engines, so every wreck train would need the capability of transporting that coal and water to the work site. While there are several excellent models of cranes available, I've been unable to find a water tender for my wreck train. Many railroads fabricated their own out of secondhand locomotive tenders, and that's exactly what the New York, Ontario & Western did. As shown in ❶ opposite, the railroad mounted an obsolete tender body on a flatcar and built a tool shed on the opposite end. This looked like an interesting car to duplicate for my layout.

Approaching the project

I had a Tichy Train Group flatcar kit that was a close match to the railroad's. The tool shed could be scratchbuilt, but the challenge would be finding an appropriate tender shell to use. Fortunately, I had good luck at a recent train show, where I found an old AHM/Rivarossi shell I could use.

The first part of the project was to modify the tender shell to resemble that shown in the photo. The prototype shell was 22 feet long and my shell was 30 feet long. I had to shorten it by 8 feet in a way that maintained the proportions of the prototype. This meant cutting the shell in five pieces to shorten the front and back the proper amount ❷.

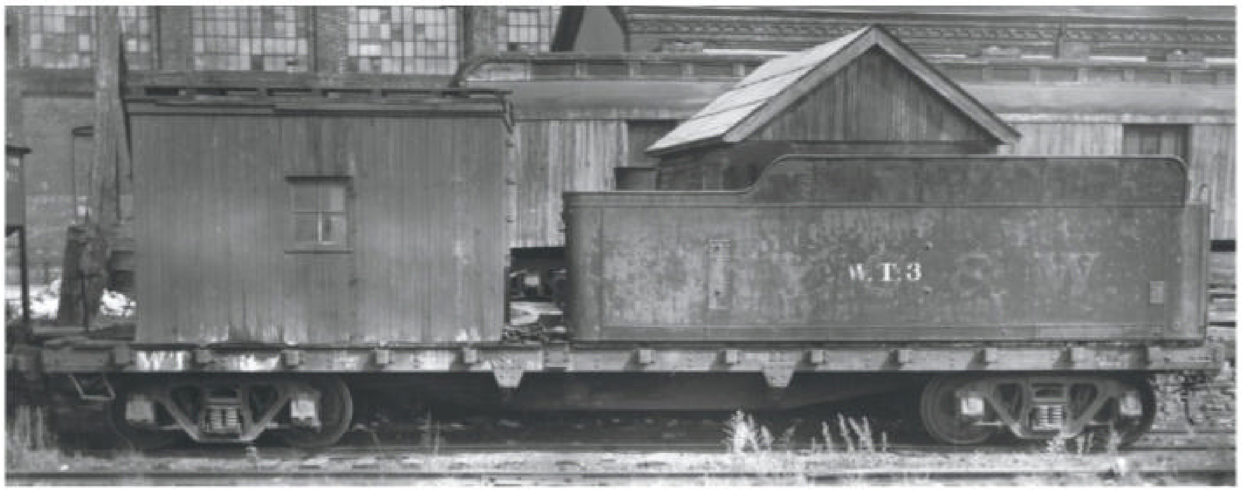
The first task was laying out the cuts. After measuring carefully, I drew pencil lines marking the area to be cut and attacked the tender with my razor saw, being careful to keep the cuts as straight and neat as possible. See photo ❸ on page 38. After the cuts were complete, I placed a piece of medium grit sandpaper on a sheet of glass and gently sanded out any imperfections.



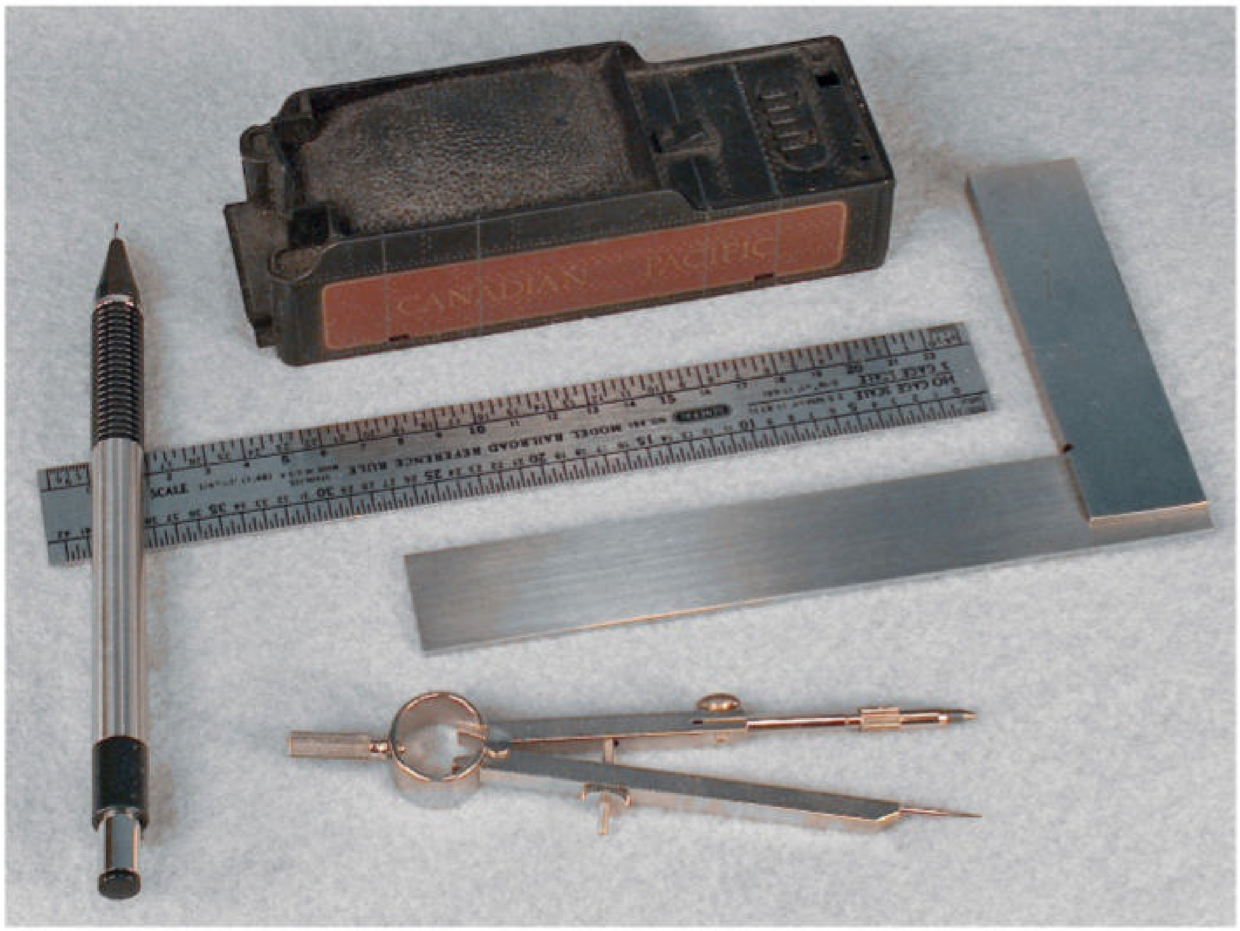
Bob Karig built this HO scale steam crane water tender based on a photo of a New York, Ontario & Western Ry. prototype. He started with a Tichy Train Group flatcar kit and an AHM/Rivarossi tender shell and scratchbuilt the shed.

With the tender in pieces, I decided to make some adjustments. First, I had to strip the paint off of the tender. Next, I didn't care for the fake coal load, so I cut that out and sanded the interior walls smooth. After the tender was assembled, I installed a new floor and slope sheet in the tender using .020" Evergreen styrene sheet.

Finally, I filled in several holes that had once held ladders and grab irons with Evergreen styrene rod.



❶ New York, Ontario & Western's Water Tender No. 3 was photographed in Middletown, N.Y., on July 26, 1957, four months after the railroad ceased operations. The car was constructed in 1942 from one of 15 40-foot, 40-ton capacity flatcars that the railroad purchased in 1910. The tender came from a Class V 2-6-0 Mother Hubbard (notice the "NYO&W" lettering bleeding through). The flatcar must have been out of interchange service for several years when the conversion was made, since its last reweigh date is May 1934. Bob's Photos photo



❷ Bob used the tools shown above to mark the tender for cutting. The pencil lines on the tender show the cuts to be made. Note how he included the rectangular slots, which locked into tabs on the underbody of the tender, in the sections to be scrapped. This saved him from having to plug the openings with styrene.

Assembling the tender

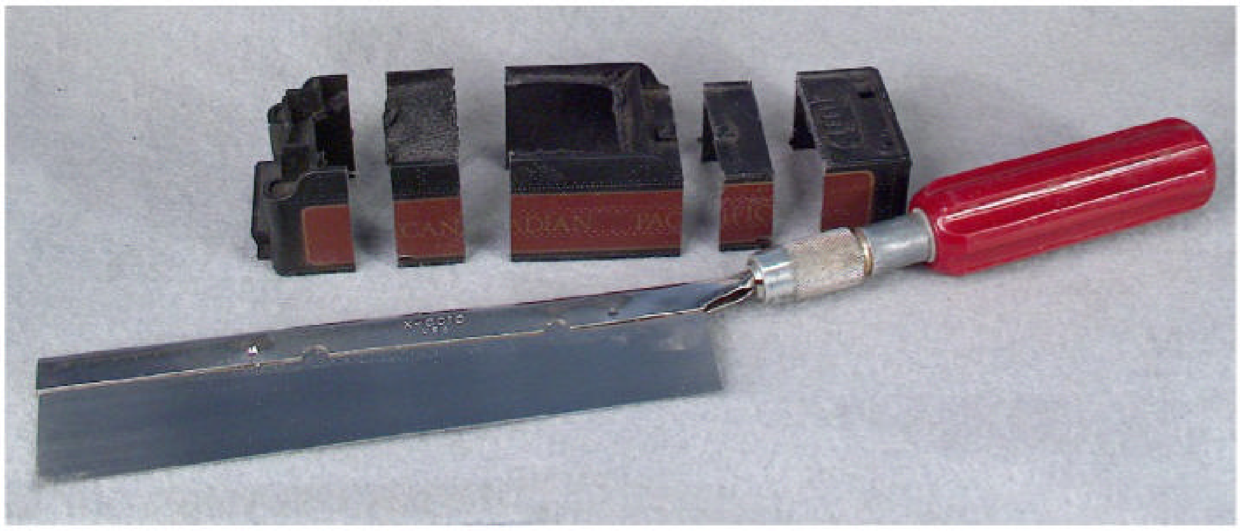
Assembly was a relatively straightforward process. After test-fitting the pieces together, I applied a generous amount of liquid cement from the inside of the shell along the first cut line and pushed the two pieces together. When I'm cementing two pieces together with a seam I don't want to show, I use a generous amount of a "hot" liquid cement in the joint. This will melt the plastic, and as the two pieces are pushed together, the softened plastic will ooze from the seam. With a little sanding, the seam will nearly impossible to see.

I then set the cemented pieces on a piece of glass to ensure that the bottom of the tender was flat. Once both joints had been cemented and had cured, I applied .020" x .100" strip styrene behind each cut to reinforce the joint. Any seam that wasn't completely sealed was filled with Squadron white putty.

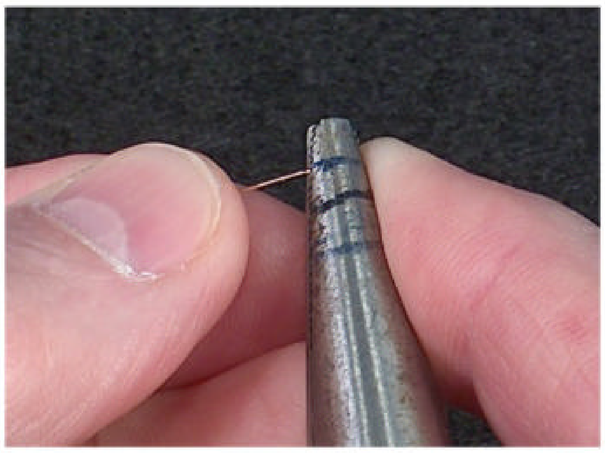
After scraping all the rivets off the tender with a chisel blade, I sanded the entire shell with progressively finer sanding materials, finishing by wet sanding the entire shell. For this task I prefer sanding sponges. They're effective, can be cleaned easily, and provide a great outcome when wet sanding.

Next I added grab irons at the rear of the tender and vertical handrails at the front. I like to make my own grab irons out of .010" phosphor bronze wire because it's close to scale.

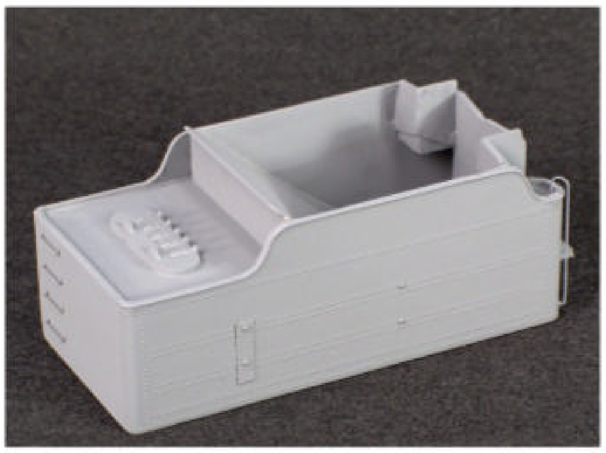
I've developed a system for manufacturing grab irons using needlenose pliers. The jaws of the pliers have a smooth taper, and I've located and marked points along the jaws corresponding to various lengths of grab irons. After putting a 90-degree bend in one side of the wire, I place the wire in the appropriate slot of the pliers and bend the other leg ❹. I can make a lot of grabs in short order with this method.



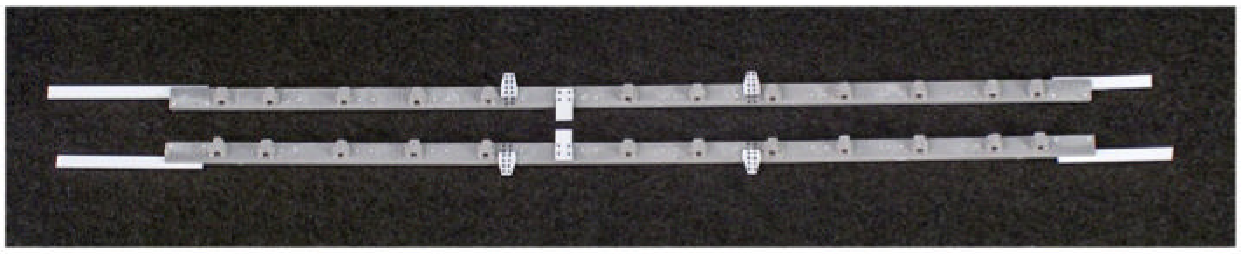
❸ After carefully laying out the cuts to be made, Bob cut the tender into five pieces with a razor saw. The second and fourth sections will be discarded. After the fake coal load was removed and edges filed smooth, Bob constructed a new coal bin out of .020" sheet styrene.



❹ Bob fashioned his own grab irons using needlenose pliers marked for various lengths of grab irons. After putting a 90-degree bend in one end of the wire, he slipped the wire into the appropriate groove in the pliers and bent the second leg.



❺ Next, Bob joined the three sections and sanded the joints smooth. He removed the existing rivet detail and wet-sanded the sides with sanding sponges to provide a smooth finish. The interior of the coal bin was created using .020" styrene sheet, and the rivet detail was created using Archer HO scale ⅞" rivet decals.



❻ This photo shows the modifications Bob made to the Tichy flatcar sides. He re-created the 13 pressed-steel stake pockets by sanding the ribs off the kit's cast-steel pockets and repositioning them. He replicated the stake pockets that had been replaced with a strap using .010" x .100" styrene strip and Archer rivet decals.

Tichy .020" rivets completed the grab iron detail. For the vertical handrails, I used .0125" wire, because these were a bit more vulnerable to being bumped.

The last step was placing new rivet patterns on the shell. This would have been unthinkable a few years ago, but with the advent of Archer Fine Transfer rivet decals, it's easily doable today. I applied the rivets as close as possible to the prototype. The Archer rivet strips can be fragile, so some care is required in laying them out. I found that a little water under the strip helped align the rivet strip and minimized risk of tearing. I set them in place using Walthers Solvaset. You can see the results in ❺.

Assembling the flatcar

This was mostly a matter of following the Tichy kit's instructions. However, I did make several changes. The first was to modify the type and placement of the stake pockets. The kit is designed with 12 cast-steel stake pockets, and the prototype had 13 pressed-steel stake pockets. This has a fairly simple fix. The first step is to fill the stake pocket mounting holes on the side of the car. I used Squadron Green body putty for this. Then I created the pressed-steel stake pockets by filing the ribs off the kit's cast-steel pockets and sanding them smooth. This produced a reasonable facsimile of a pressed-steel stake pocket found on the NYO&W car.

I laid out the placement of the stake pockets in accordance with the prototype photo, mounting the side sills back-to-back on my workbench to ensure that each side's stake pockets were set at the same interval ❻. It's important that the stake pockets are uniformly aligned. I noted on the prototype that one of the stake pockets had been replaced with a strap that had been riveted in place. I duplicated this with .010" x .100" styrene strip and Archer rivets.

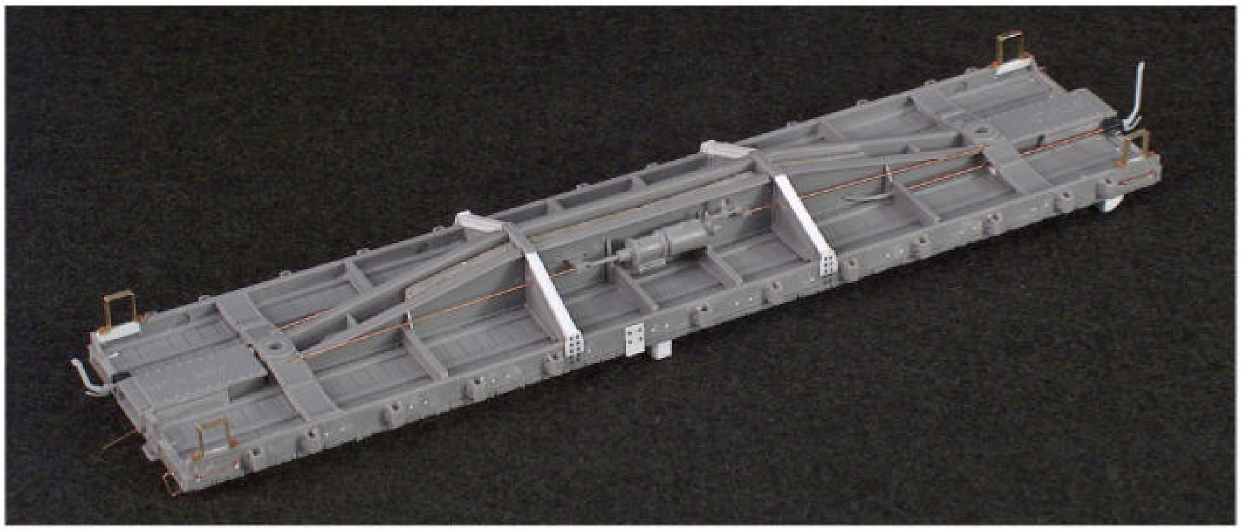
As I was laying out the side sill, I also wanted to duplicate the increased depth of the main cross sills. I located and marked the positions on the side sills and cemented in place trapezoidal shapes cut from .010" x .100" styrene strip. I finished them by applying Archer rivet detail.

I also had to increase the depth of the cross sill in the underframe. I did this by shaving the "T" off the top (or rather bottom) of the cross tie and cementing a .030" x .040" styrene strip in place to raise the cross sill. Then I replaced the "T" with .015" x .060" styrene strip and sanded the assembly smooth.

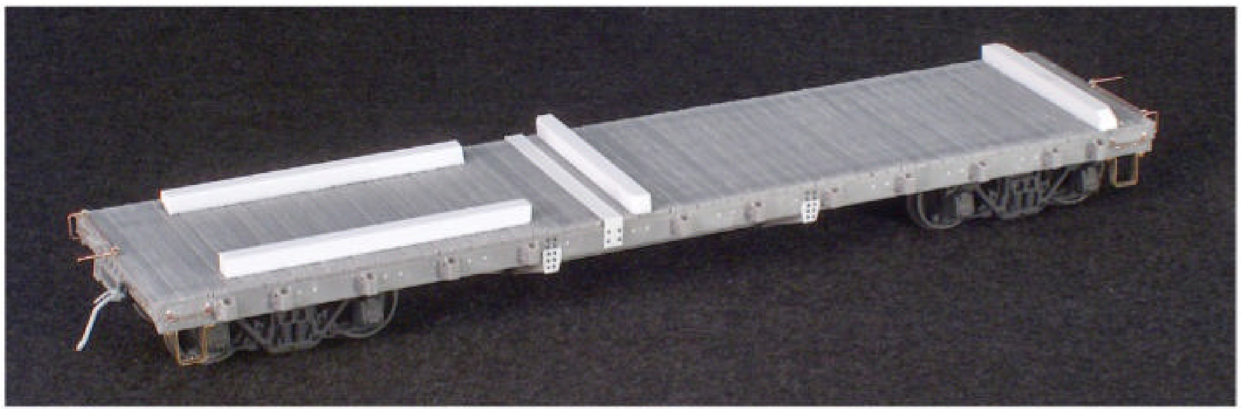
I made a few other changes to the kit. The stirrup steps didn't match the prototype's, so I made my own out of .005" brass strips. To provide a mounting pad for the stirrup steps, I filled in the mounting gap for the kit's steps with .015" x .100" styrene strip when I assembled the side sills. After the cement was cured, I trimmed them to size as shown in ❼ opposite.

The steps were the final item that I added. I glued these in place with cyanoacrylate adhesive (CA) and added Tichy 1¾" nut-bolt-washer castings to the wings of each step. I also replaced all the kit's grab irons with my own, created from .010" phosphor bronze wire using the same methods as before.

I then added Detail Associates air hoses to each end of the car and aligned the train line to meet it at the end sill. This required filling in the existing gap in the body bolster for the train line and drilling a new hole. I also added coupler lift levers fashioned out of .0125" phosphor-bronze wire and Detail Associates 3½" eyebolts ❽.



⑦ The underframe of the flatcar was assembled according to the kit's printed instructions, with a few exceptions.



⑧ This view shows the kitbashed Tichy Train Group flatcar. Bob added uncoupling levers bent from .0125" phosphor-bronze wire and stirrup steps from .005" brass sheet. He has also mounted pieces of .100" x .100" styrene strip on the car's deck to hold the tender shell and tool shed in place.

Parts and materials

Accurail
0166 Andrews truck

AHM/Rivarossi
Tender shell

Archer Fine Transfers
AR88025 resin rivet head decals

Detail Associates
2203 nut-bolt-washer casting, ¾" bolt
2206 3½" eyebolt
6206 freight car air hoses

Evergreen Scale Models
212 .080" styrene rod
2040 .020" V-groove siding, .040" spacing
9020 .020" sheet styrene
assorted sizes strip styrene

Kadee
AH-1K air hoses and angle cocks, mounting bracket

K&S
250 brass sheet, .005"

Northeastern Scale Lumber Co.
W105NEB work car window, 18" x 28"

Reboxx
33-1-1.025 33" wheelsets

Tichy Train Group
1101 .010" phosphor bronze wire
1106 .0125" phosphor bronze wire
4021 40-foot, 50-ton flatcar
8009 four-light wood door
8016 1¾" nut-bolt-washer
8017 .020" rivets

Miscellaneous
Premiere 22 x 22mm cover glass, .13-.17mm thickness
Rail Graphics custom decals
Sergent Engineering type E couplers

The shed

The shed became the fun part of the project. As measured from the photo, the shed was 12 feet long and 9 feet wide. The sides were 8 feet high, and the peak of the roof was 9 feet. I used Evergreen V-groove .040" scribed styrene. Before doing any cutting, I roughed up the siding along the grain with a coarse sanding block to simulate wood grain. I did the same with all other wood pieces for the model as well.

It was important that the sides and ends be perfectly square. In the past, I've ruined cuts on sheet stock as my knife blade or straight edge slipped during the cutting. Also, I've come to distrust my own pencil marks, so I've resorted to a system that yields consistently square corners for me. I use an X-acto cutting mat with squares printed 10 to the inch. I align one side against a line and tape it in place.

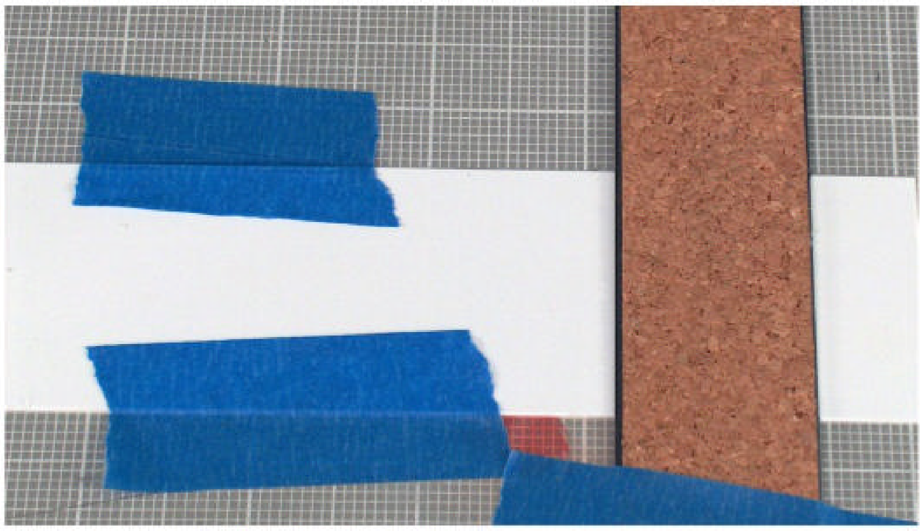
I then ensure that the perpendicular side is also perfectly aligned. If it's not, I cut that edge to achieve the alignment. Next, I measure the appropriate distance and mark the sheet to be cut. When making the cut, I use a rule that's as long as the mat and ensure that it's perfectly aligned with the squares. Then I tape the rule in place to make the cut, pressing the knife lightly and making multiple passes to get a clean cut (⑨ on the next page). I cut two wide strips, one scale 8 feet tall and the other 9 feet tall. These would become the sides and ends, respectively. Then I cut the sides and ends to the respective lengths, aligning the cuts along one of the scribed lines.

To form the peak on the ends, I marked the center of the top of one end and on each side marked the height of the side. I then drew lines that connected the marks and made the cuts. I fashioned the second end from the first, ensuring they were identical.

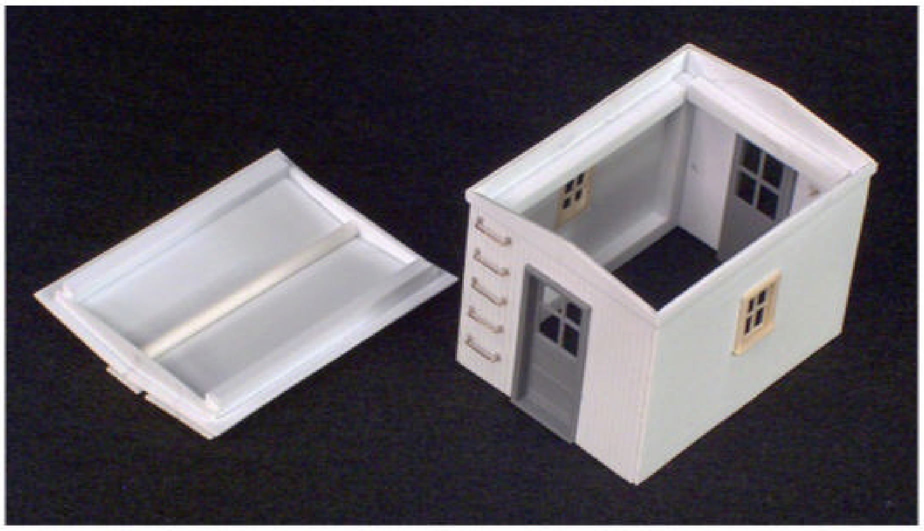
I used the ends as a template for the roof supports and roof trim in a later step. The exterior trim along the tops of the sides was cut from .010" x .060" Evergreen strip. The trim along the top of the ends was cut from .010" x .156" styrene and trimmed to match the angle of the roof.

I used Tichy doors and Northeastern Scale Lumber Co. work car windows for the project. I cut the openings for the doors and windows and cemented .100" x 100" styrene strip along the bottom and top of the sides to make the walls more rigid. I then cemented a strip above the doors to achieve the same effect on the ends. I set the strips that ran along the top .100" below the top of the walls and ends to allow room for the roof stringers. All the interior strips were adjusted to fit to allow the sides to overlap the ends on each side ⑩. Then I added .010" wire grab irons and grab iron detail using Detail Associates ¾" diameter bolts. The windows, doors, grab irons, and reinforcing strips were all added before assembling the sides.

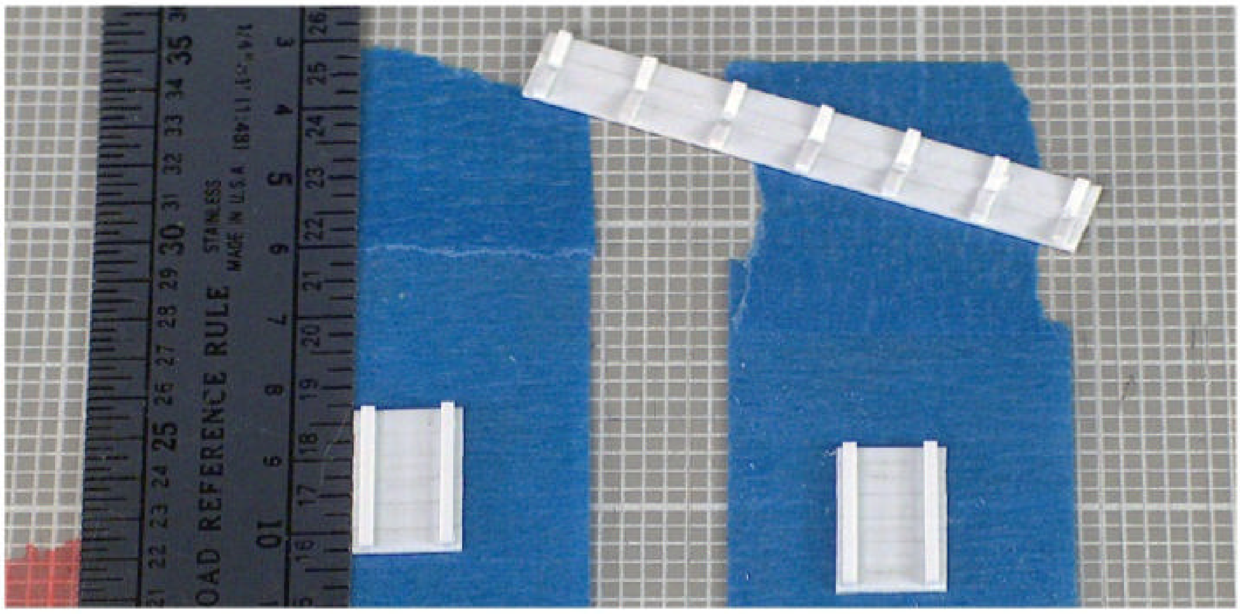
In attaching the sides to the ends, I first test-fit the sides together on a sheet of glass to ensure that the bottom was



❾ Bob minimizes the risk of a wayward hobby knife by taping the work and straight edge in place on his cutting mat, aligning them along its graph lines. To cut the piece, he uses a new blade and makes a series of light passes rather than trying to cut the styrene in one or two passes.



❿ This photo shows the interior and exterior construction of the tool shed. The doors, windows, and grab irons, as well as the reinforcing strips, were added before the shed was assembled. The roof was made of .020" styrene sheet, reinforced at the ridge with .080" styrene rod.



⓫ Bob assembled the running board from .015" x .060" styrene strip. He placed a piece of tape sticky-side up on his work surface and put a straightedge along the side to align and hold the pieces. Once they were aligned, he glued the boards together with liquid cement.

flat. Then, while holding one side to one end, I touched the joint with liquid cement to tack the two together. I continued until the perimeter of the shed was complete. Once I was convinced the bottom was flat and the assembly was square, I applied a more liberal dose of cement while holding the shed on the glass to finish this phase.

Painting the shed was going to present a problem because it would be a different color than the flatcar and roof, and I wanted to glaze the windows. This meant that I'd have to be able to get inside the shed after it was painted to install the windows. Since the sides and roof were going to be two different colors, I decided to make the roof so it could be attached after painting.

The roof was constructed of .020" sheet styrene. After I'd cut the pieces and beveled where they would be joined, I placed them on the shed walls and cemented them together. This way, I could be sure that the pitch of the roof would match the pitch of the ends. After it had cured, I reinforced the seam with .080" styrene rod. I cut two pieces of styrene .020" x .156" to match the pitch of the ends and cemented them in place. Then I placed .100" x .100" strip styrene along the sides of the roof interior to fit inside the walls of the shed and hold the roof in place.

I used .015" x .080" styrene strip to build the running boards. This is a bit oversized, but acceptable. Before cutting the strips into pieces, I rounded over the edges so that distinct boards could be seen. Then I cut the strip into equal lengths and assembled them on a piece of masking tape that I'd set sticky side up on my workbench to hold the small pieces in place for assembly ⓫. The running board supports are .030" x .040" styrene, aligned to follow the prototype photo. I cut these oversize to facilitate their handling. After cementing the supports, I cut them to width and cut V's into them corresponding to the pitch of the roof. Then I mounted .010" wire grab irons and Detail Associates ¾" diameter bolts on the laterals.

Finishing touches

From this point on, it was simply a matter of assembly. I cemented mounting lugs on the flatcar for both the tender and the shed to hold them in place. I then painted the tender, flatcar, shed, and roof as separate pieces. All parts except the shed were painted Steam Power Black. For the shed I used Pennsy Tuscan. When the paint was dry, I decaled each piece with decals I had made by Rail Graphics.

I added weights to the flatcar to bring it up to the National Model Railroad Association's recommend practice. Then I placed the tender on the flatcar, using the lugs as a guide. I cemented glass microscope covers behind the windows and doors using CA and slipped the shed in place. The roof was a tight fit, so there was no reason to cement it in place.

To simulate the T-section Andrews trucks used by the prototype, I used Accurail Andrews trucks with Reboxx scale wheels. I'm hoping that some day a manufacturer will produce a model of the Andrews T-section truck.

This completed the project until it comes time to weather the entire car. Being able to slip the pieces off the model will make that task significantly easier.

I hope you find some of these techniques useful in your next project. MR

Bob Karig was the author of Coal Cars: The First Three Hundred Years. *He was a lifelong model railroader who volunteered as a docent at the Railroad Museum of Pennsylvania. Bob passed away in 2012.*

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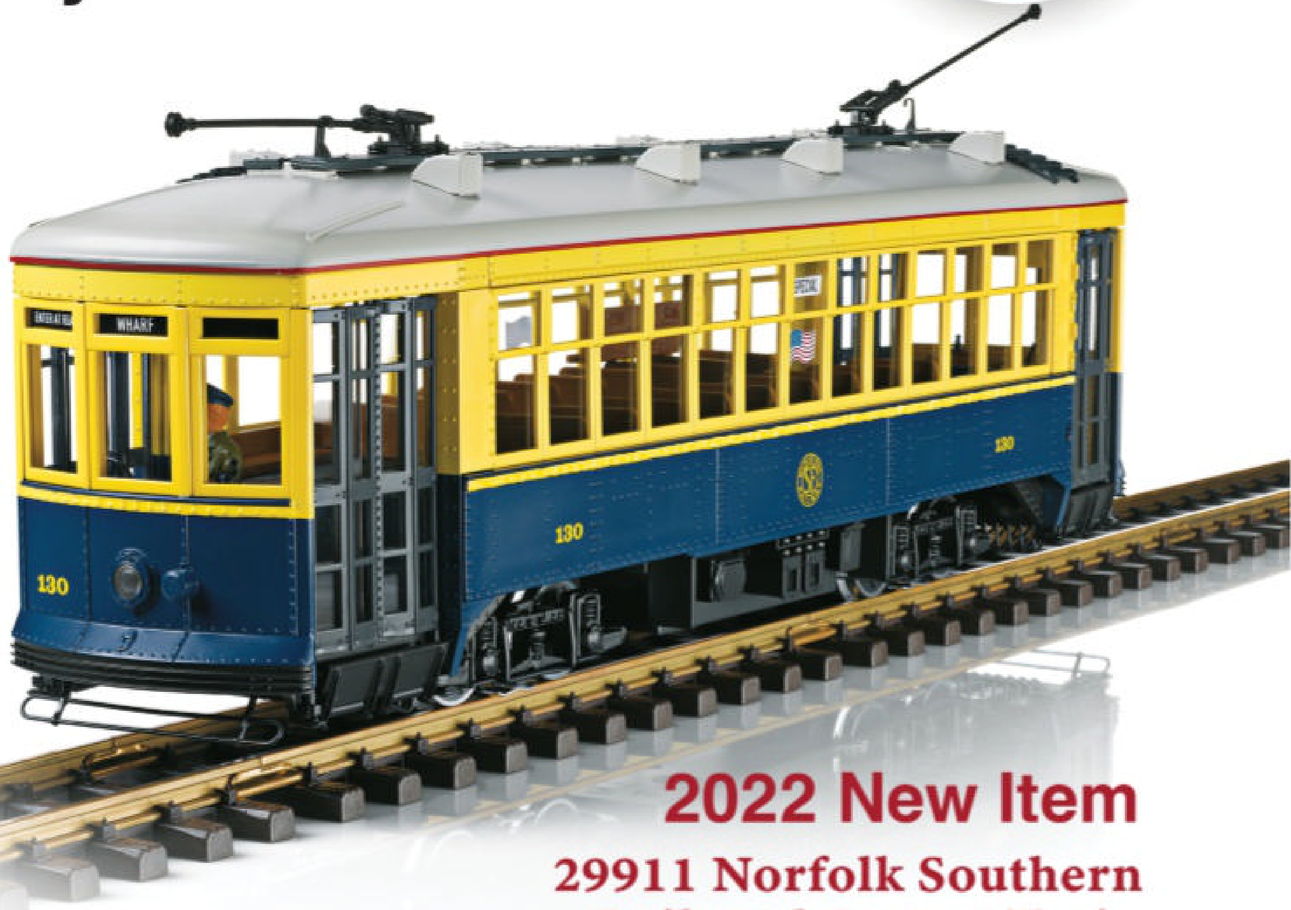
2022 New Item

20384 San Francisco Streetcar, Car No. 130

This is a model of the original 1914 San Francisco Muni streetcar the “Lucky 130.” The four-axel streetcar got its nickname because it was saved from being scrapped in 1958 to tow broken down PCC type streetcars. The streetcar includes an mfx/DCC digital decoder with many light and sound functions, for the first time! Running sounds work in analog. The wheelsets are driven by two Bühler motors.

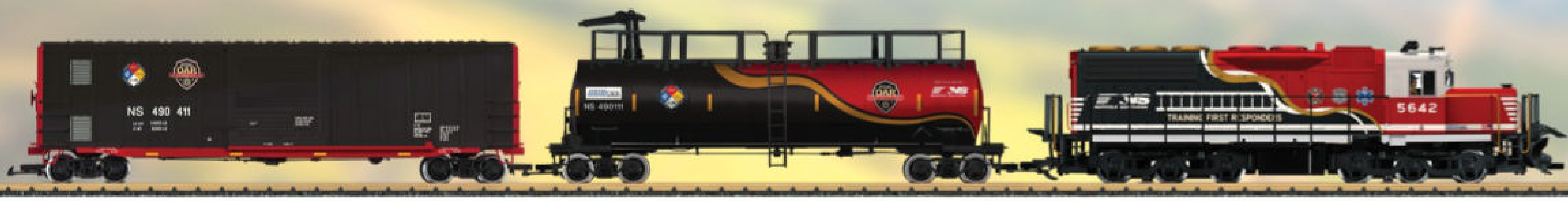


2022 New Item

29911 Norfolk Southern Railroad Rescue Train

This is a model of a NS rescue and training train used to educate and train first responders. The train consists of a diesel locomotive, a tank car and boxcar. The locomotive includes an mfx/DCC decoder for many digitally controlled light and sound functions, and both trucks are driven by two powerful Bühler motors. Running sounds work in analog. The tank car can be filled with water and sprayed using the digitally controlled pump.

5642
FIRST RESPONDERS



A portion of the proceeds from the sale of this product will be donated to First Responders Foundation.

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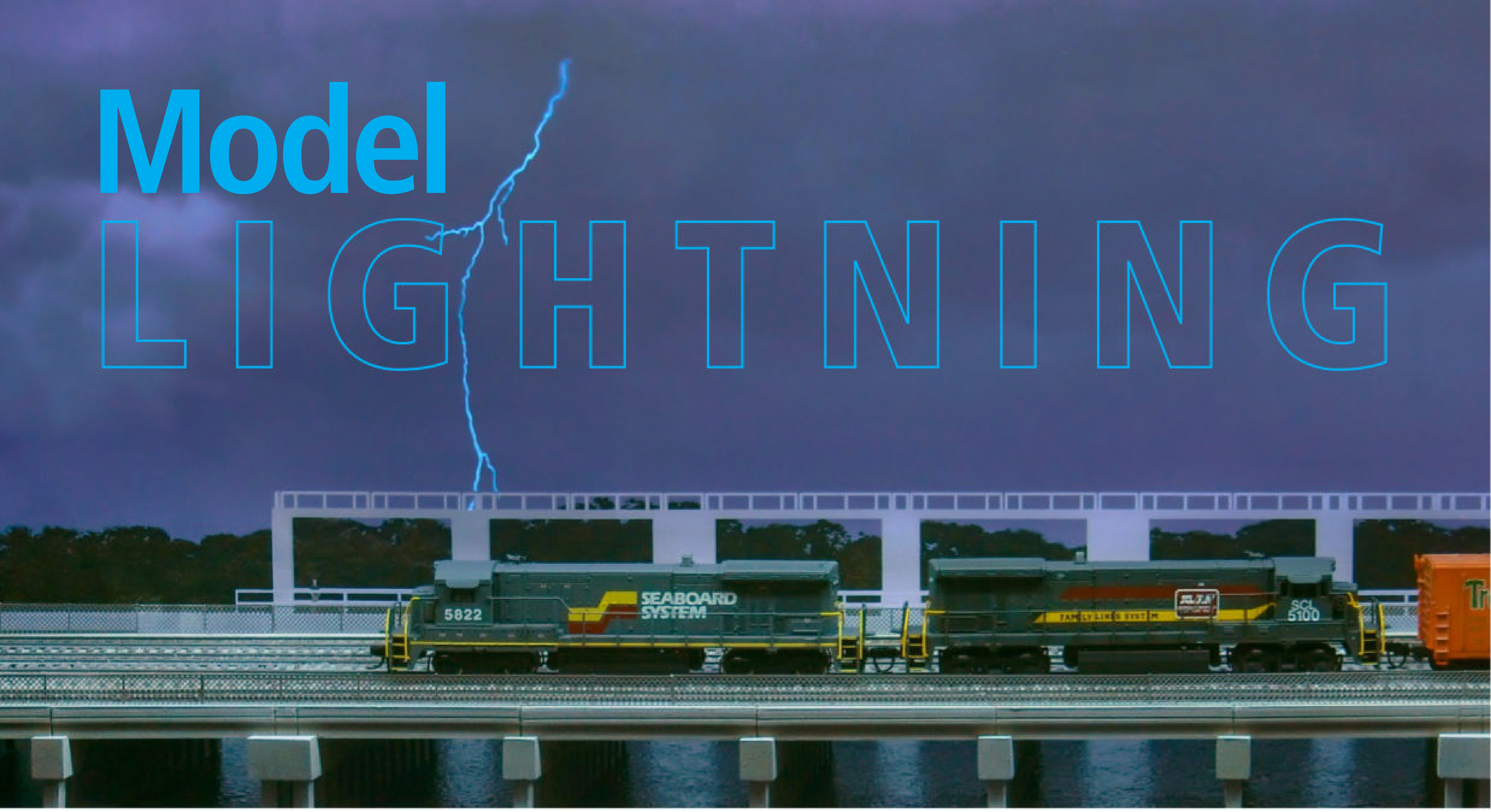
Model LIGHTNING



Electroluminescent panels make it easy to add a thunderstorm scene to your model railroad

By Alex Marchand • Photos by the author

When I read the September 1993 *Model Railroader* as a kid, I came across an article by Rand Hood. "Modeling a rainscape" helped me realize that simulating rainy weather on a model railroad was a viable option. More than a quarter century later, the inspiration from that article continues to reverberate in my modeling.

I model Florida in N scale [See "Vistas from the new Bone Valley" in the December 2020 issue – *Ed*]. My favorite Florida weather is thunderstorms, so I made the weather on my layout a stormy day. To reinforce that theme, I added lightning bolts.

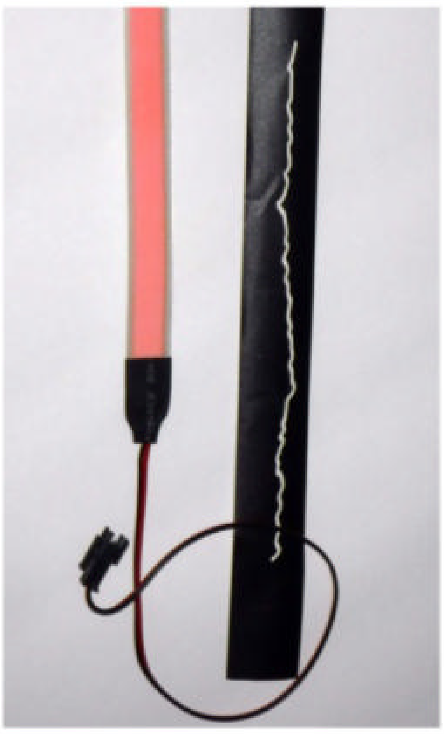
Electroluminescent light

If you have the right kind of layout, you could simulate lightning bolts with overhead projection. Inexpensive lightning bolt projectors are sometimes available as Halloween decorations at big-box stores.

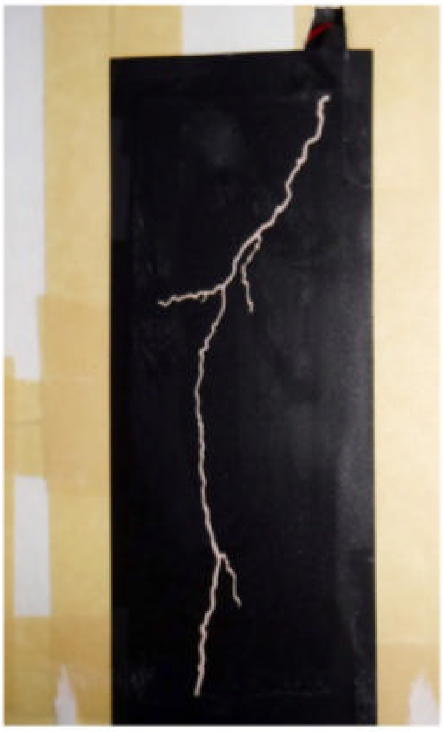
Since I have a gallery-style layout, projection wasn't an option, so I had to come up with another method. I settled on electroluminescent (EL) panels.

Electroluminescence is old technology. The lights are made of copper wire coated with phosphor that glows when an alternating current (AC) is applied to it.

Many modelers are familiar with EL light thanks to Miller Engineering, which has been using the technology to produce illuminated billboards for many years. Electroluminescent light comes in wire form, thin panels of various sizes, and in different colors. I purchased my white EL lights online in three forms: A 9-foot wire, a 2 x 6-inch panel, and a .55" x 23.6" panel/tape, ①.



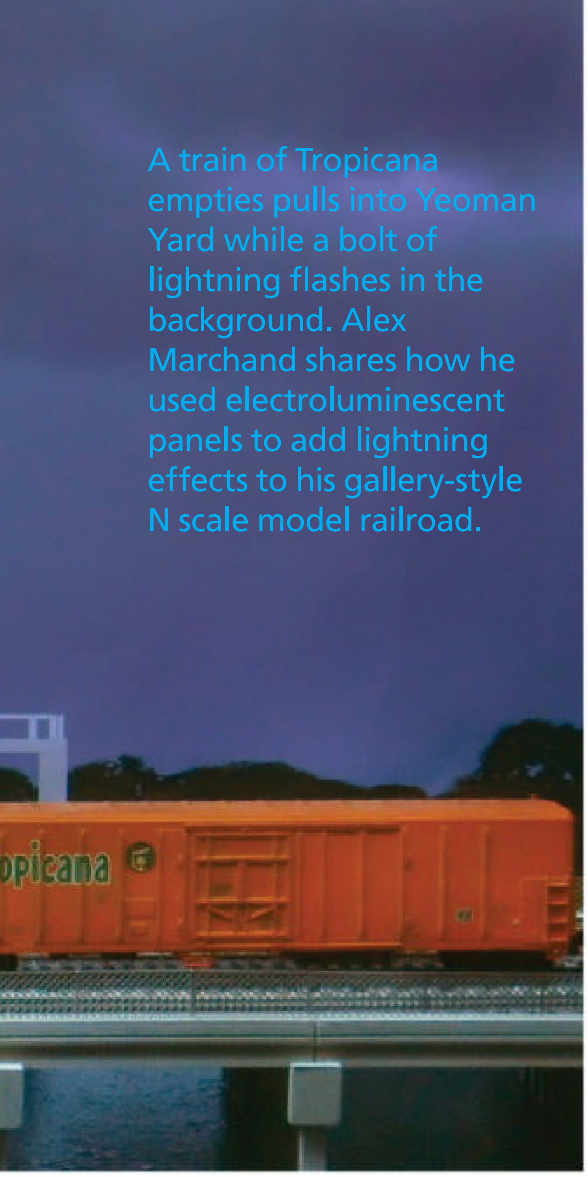
① **Electroluminescent panel.** Alex purchased three EL lights for his project from online retailers. This photo shows the .55" x 23.6" panel/tape. To the right is a lightning bolt mask that's applied to the panel.



② **Homemade masks.** A digital cutter and black adhesive vinyl were all Alex needed to make lightning bolt shapes. This one, attached to a 2 x 6-inch EL panel, was used for the bolt shown above.

Electroluminescent lights run on AC power and come with different power options, such as sound-activated controllers, battery-powered inverters, and 12V DC inverters. I wanted to power my EL lights with a sound-activated controller to sync the lightning flashes with the thunder sounds. None of the low-cost panels I could find included a sound-activated controller; only the wire did.

There was little price difference between buying a



A train of Tropicana empties pulls into Yeoman Yard while a bolt of lightning flashes in the background. Alex Marchand shares how he used electroluminescent panels to add lightning effects to his gallery-style N scale model railroad.

sound-activated controller individually or getting it with 9 feet of EL wire. Although I knew the wire probably wouldn't work for modeling lightning, I bought it anyway just for the controller.

Even though EL light can technically be run off regular AC power, you want to use inverters made specifically for it, as they provide the optimal frequency for longevity and brightness. All of the EL lighting I purchased had JST-SM 2-pin connectors. This proved fortunate, as the wiring on my layout uses the same connectors.

The EL panels can be cut into different shapes. For this project, I opted to make lightning bolt masks using black adhesive vinyl and a digital cutter. I then applied the vinyl to the panels ②. The same effect could be achieved using any opaque, easy-to-cut material, such as black poster board, glued or taped over the EL panel.

Bringing it all together

My layout's backdrop is made of foam core board covered with printed paper. All I needed to do was cut a slot in the board for the EL panel and wiring. After I taped the components in place, I used spray adhesive to attach the printed paper backdrop over the panel and wiring.

Since the backdrop paper is semitransparent, when the EL panel is illuminated, an evenly lit lightning bolt appears from what seems like nowhere ③. Depending on the paper used and the layout lighting, the black mask might be visible. If it is, paint the mask opaque white.

I used a single sound-activated, battery-powered controller to operate both EL panels on my layout ④. Since I wanted the EL panels to power up on the same switch as the rest of the layout, and since I didn't want to be restricted by batteries, I used a 3V DC power supply instead. There are many tutorials on the internet that show how to convert batteries to plug-in. The method I used involved making two faux 1.5V AA batteries out of styrene tubing with small screws on the ends, wired to a 3V DC power supply.

The thunder sounds on my layout are provided by a Dream Player Pro (pricom.com/audio/DreamPlayerPRO.shtml). A clap of one's hands is all that's needed to activate the lightning.

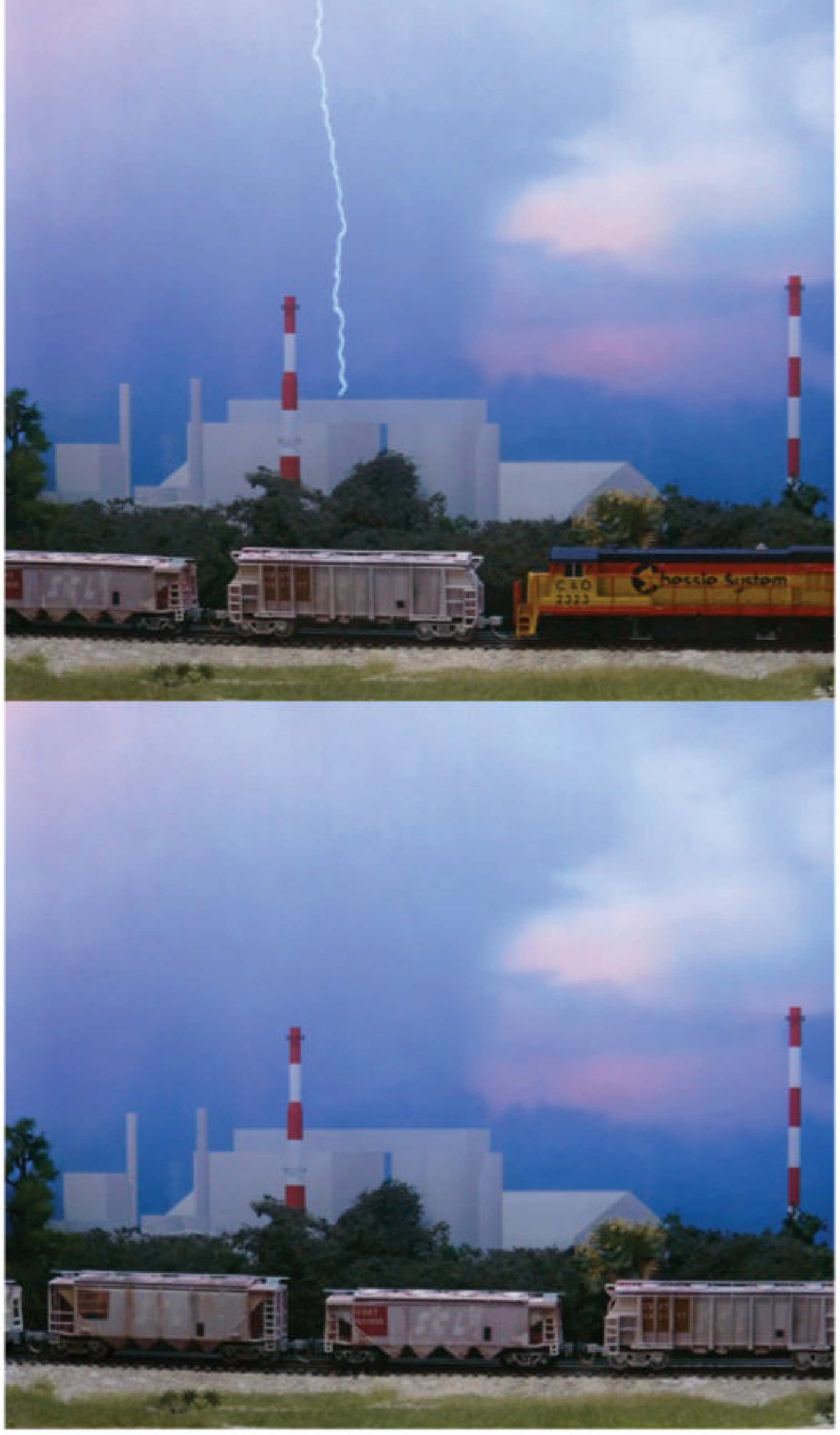
An economic solution

For less than $20, I was able to add two bolts of sound-activated lightning to my layout. It was well worth it for a really neat, yet relatively simple, effect.

Although I used EL panels to make lightning bolts on my layout, they could be used with semitransparent backdrops in other ways. A few ideas that come to mind include simulating the moon or setting sun or illuminating windows in a city skyline.

I'm sure there are plenty of applications for EL light on model railroads that I've yet to consider. So get some EL light panels and tinker around with them. Who knows what other model railroad applications are waiting to be discovered?

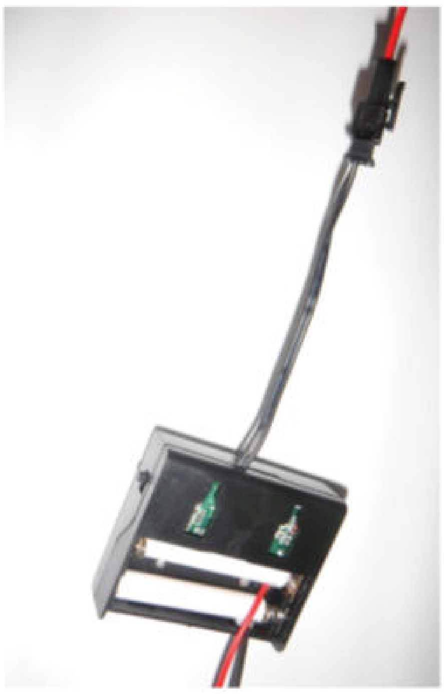
Alex Marchand is a regular contributor to Model Railroader *magazine.*



③ **Before and after.** These photos show the EL panel when it's illuminated (top) and off (bottom). The backdrop is semitransparent paper attached to foam core board.

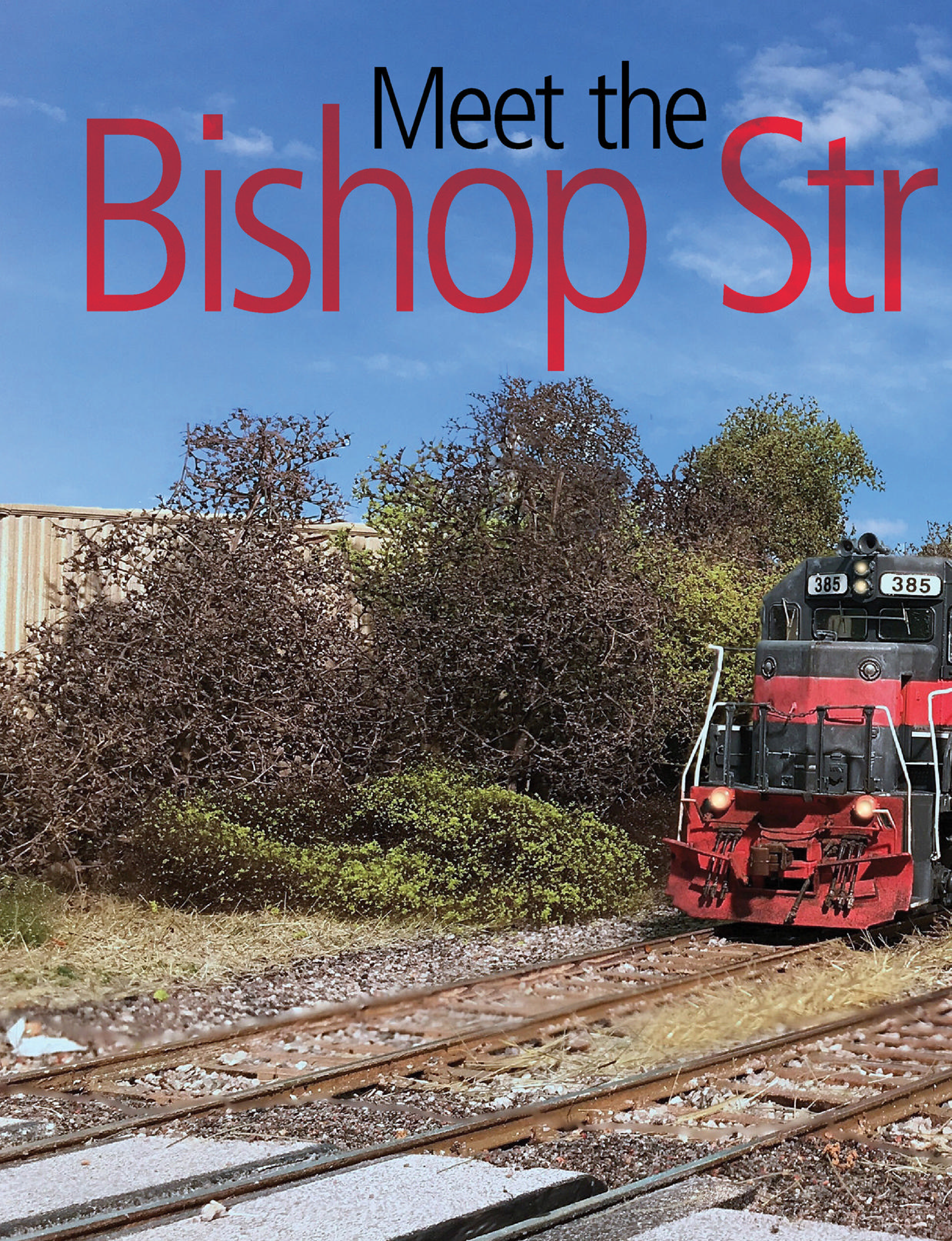
Materials list

- White electroluminescent panels
- Sound-activated, battery-powered electroluminescent controller
- 3V DC power supply
- Black adhesive vinyl
- Semitransparent printed backdrop



④ **Two for one.** Alex uses one sound-activated, battery-powered controller to operate both electroluminescent panels. He powers the controller with a 3V DC power supply.

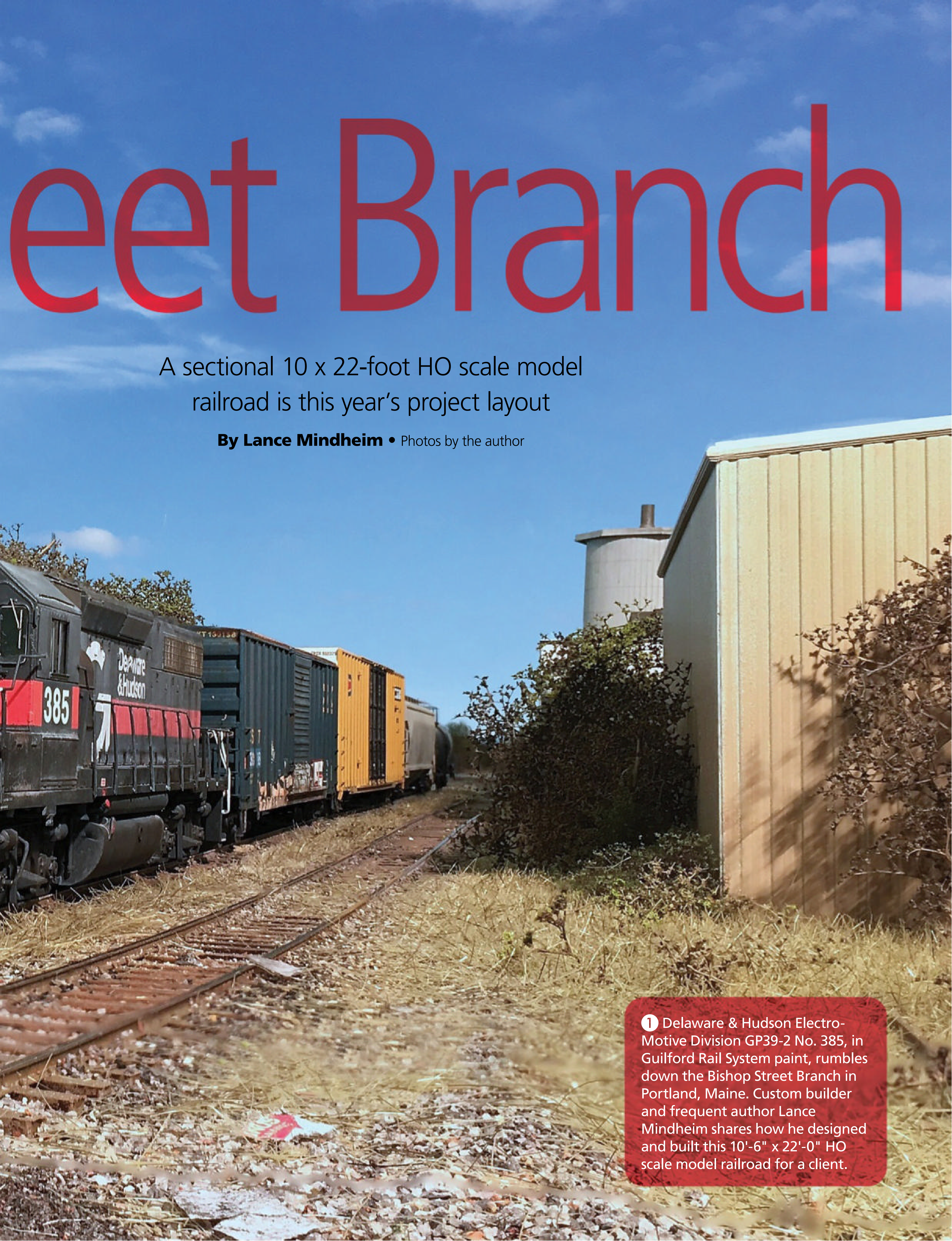
Meet the Bishop Str



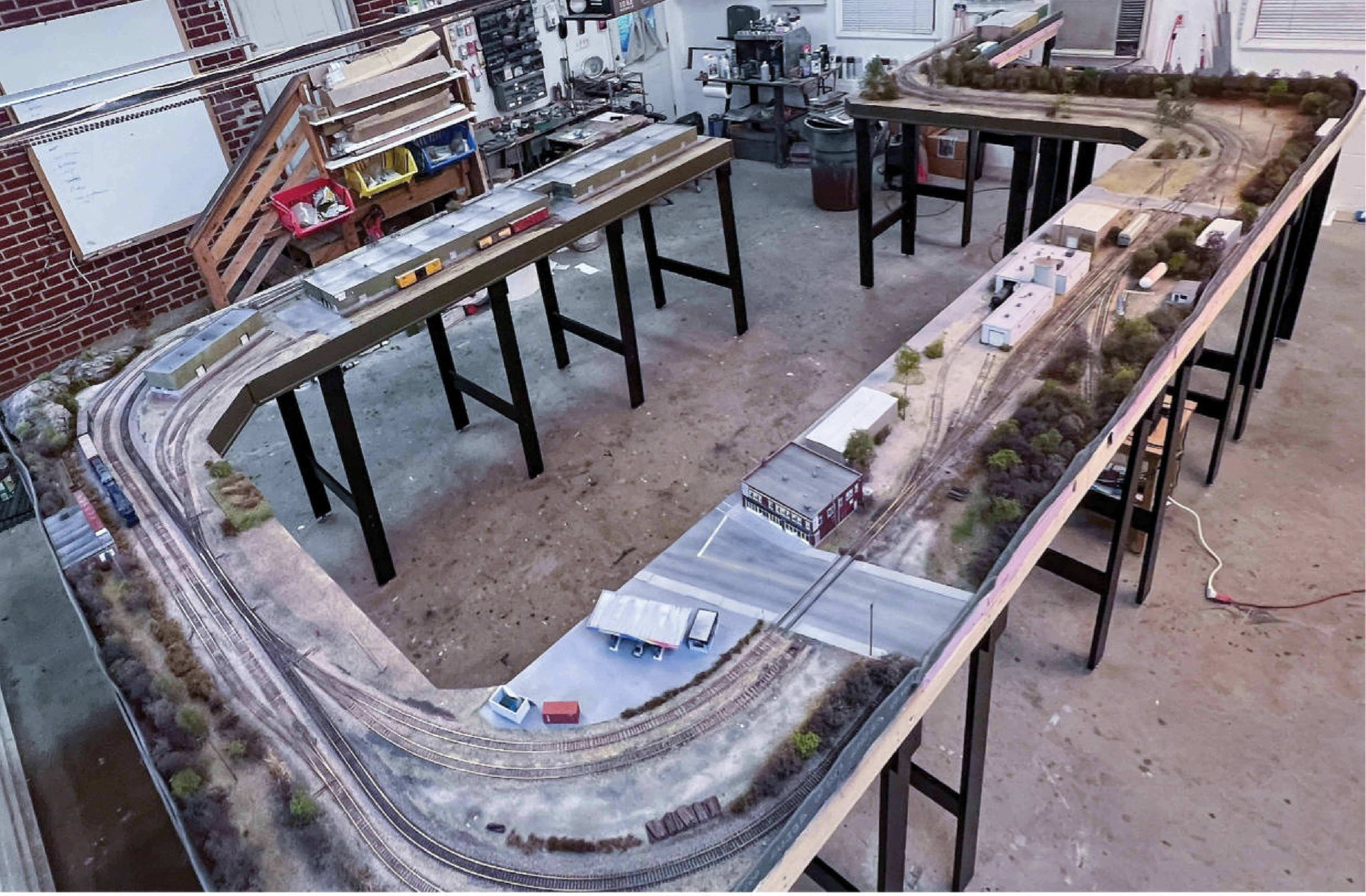
eet Branch

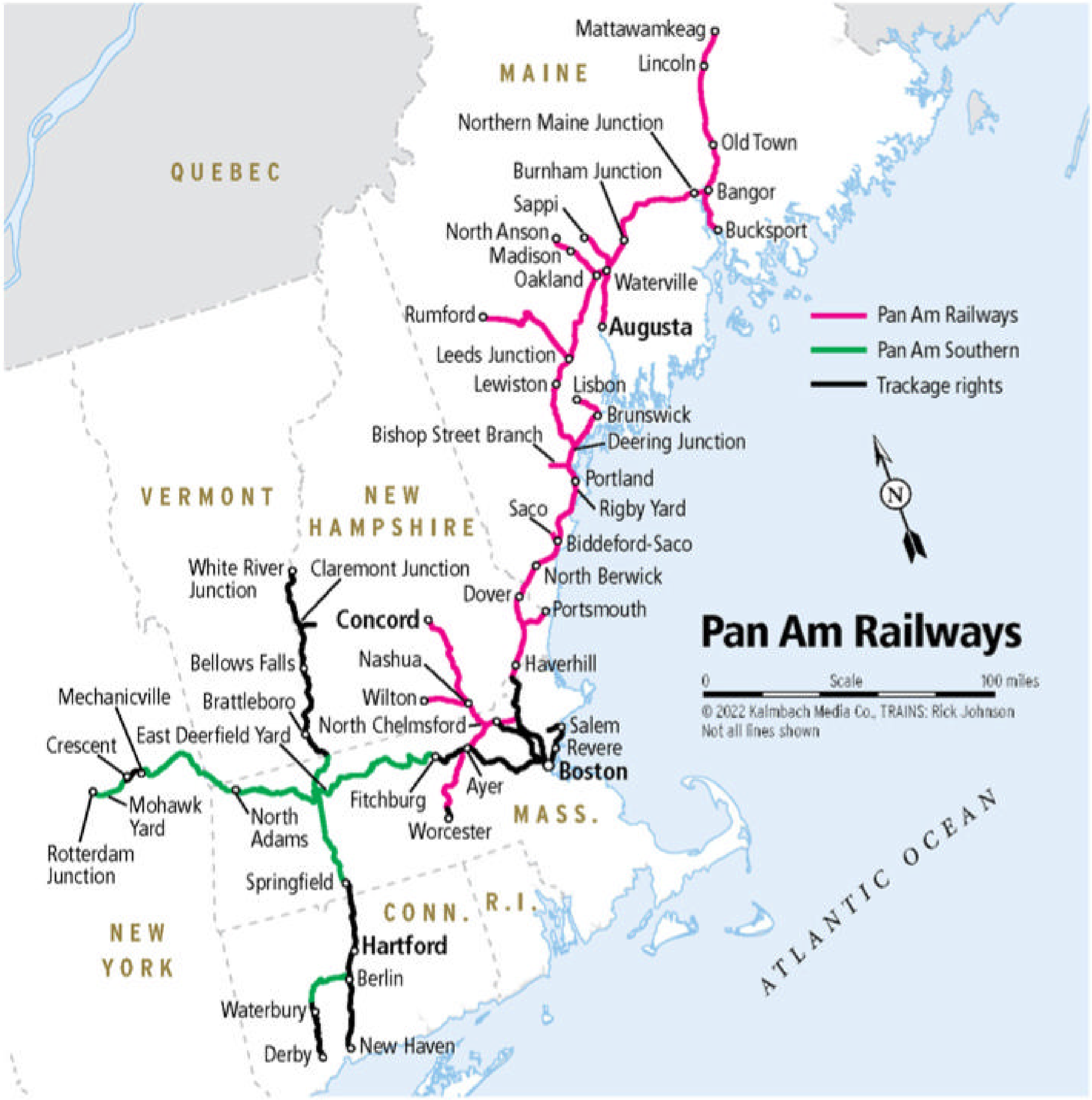
A sectional 10 x 22-foot HO scale model railroad is this year's project layout

By Lance Mindheim • Photos by the author



① Delaware & Hudson Electro-Motive Division GP39-2 No. 385, in Guilford Rail System paint, rumbles down the Bishop Street Branch in Portland, Maine. Custom builder and frequent author Lance Mindheim shares how he designed and built this 10'-6" x 22'-0" HO scale model railroad for a client.




Pan Am Railways
Pan Am Railways
Pan Am Southern
Trackage rights
0
Scale
100 miles
© 2022 Kalmbach Media Co., TRAINS: Rick Johnson
Not all lines shown
N
QUEBEC
MAINE
VERMONT
NEW HAMPSHIRE
MASS.
CONN.
R.I.
NEW YORK
ATLANTIC OCEAN
Mattawamkeag
Lincoln
Northern Maine Junction
Old Town
Burnham Junction
Bangor
Sappi
Bucksport
North Anson
Madison
Oakland
Waterville
Rumford
Augusta
Leeds Junction
Lewiston
Lisbon
Brunswick
Bishop Street Branch
Deering Junction
Portland
Saco
Rigby Yard
Biddeford-Saco
White River Junction
Claremont Junction
North Berwick
Dover
Portsmouth
Concord
Haverhill
Bellows Falls
Nashua
Mechanicville
Brattleboro
Wilton
Salem
North Chelmsford
Revere
Crescent
East Deerfield Yard
Boston
Ayer
Mohawk Yard
North Adams
Fitchburg
Worcester
Rotterdam Junction
Springfield
Hartford
Berlin
Waterbury
Derby
New Haven

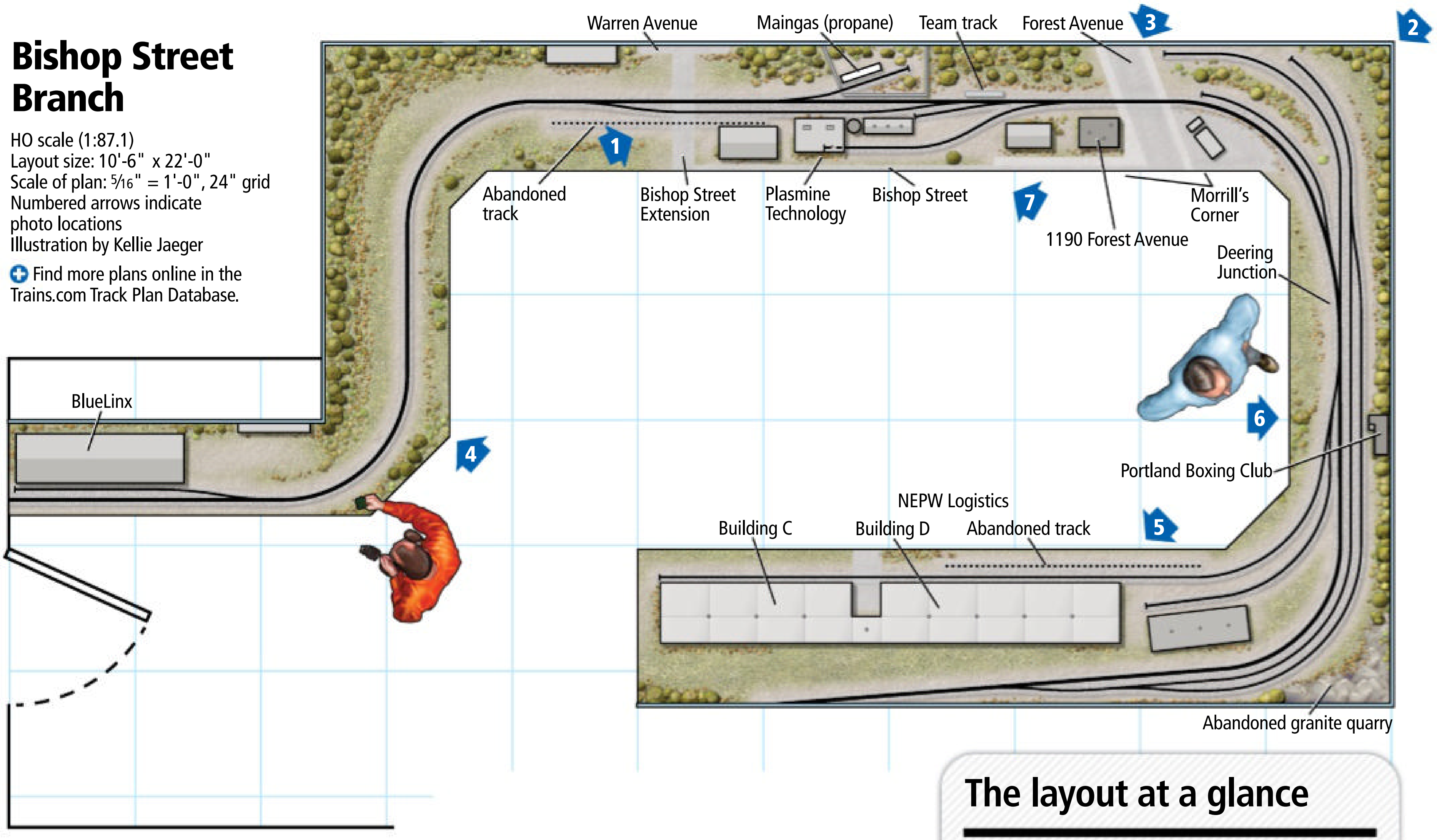
② This overall photo shows the Bishop Street Branch set up in Lance's workshop. The model railroad was designed to be dismantled for shipment to the client's house.

Project layouts have been a long-standing tradition in *Model Railroader*. Names like the Pine Tree Central, Clinchfield, and Beer Line will resonate with longtime readers of the magazine. This year's layout, the HO scale Bishop Street Branch, will continue the tradition, but with a twist.

Unlike previous project layouts, the editors at MR asked me to write this year's series from the perspective of a custom builder – somebody who builds layouts for a living. As we progress to the how-to articles, I'm going to take a slightly different approach from the traditional step-by-step style. Instead, I'm going to focus on what I call "difference makers." The construction methods for some steps are more crucial than others, and I'll be calling those out as we go.

Meet the Bishop Street Branch

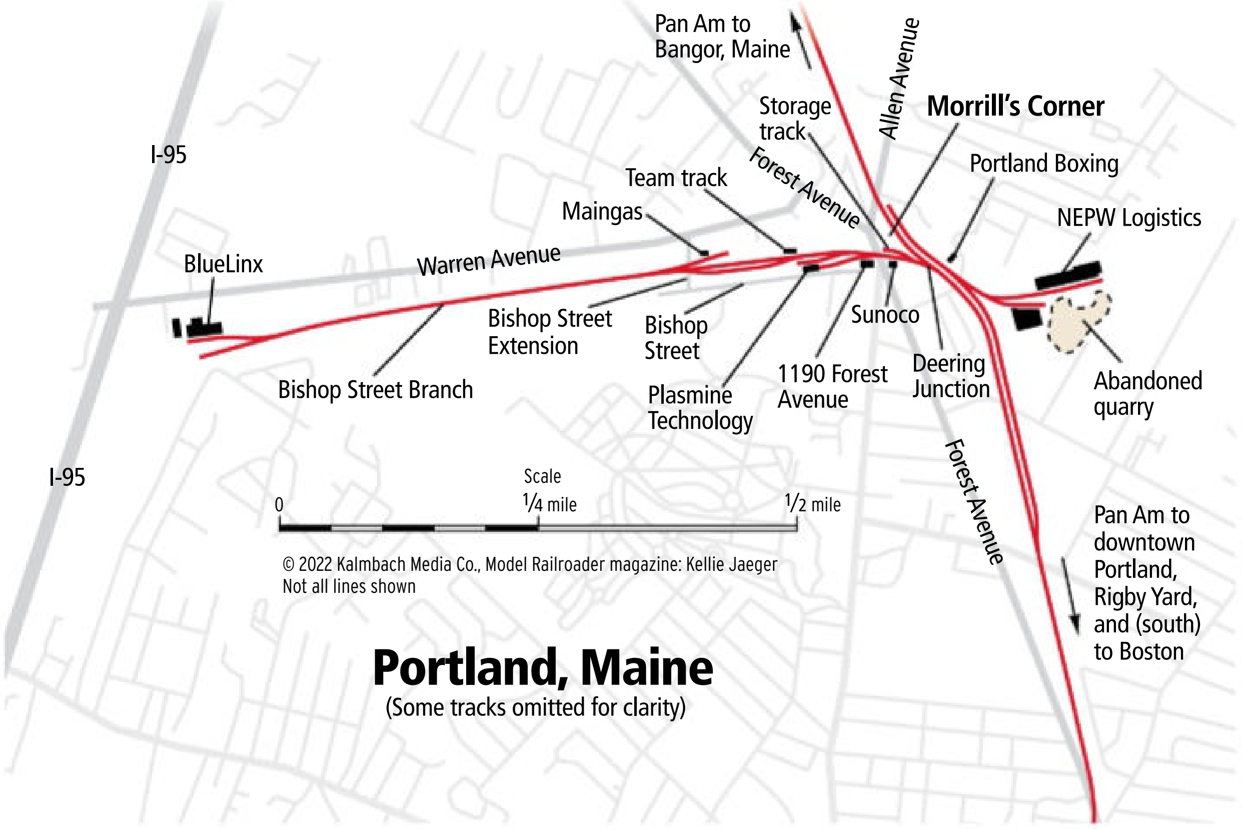
The 10'-6" x 22'-0" HO scale model railroad is based on Guilford Rail


Warren Avenue
Maingas (propane)
Team track
Forest Avenue
3
2
1
Abandoned track
Bishop Street Extension
Plasmine Technology
Bishop Street
7
1190 Forest Avenue
Morrill's Corner
Deering Junction
6
BlueLinx
4
Portland Boxing Club
NEPW Logistics
Building C
Building D
Abandoned track
5
Abandoned granite quarry

Bishop Street Branch

HO scale (1:87.1)
Layout size: 10'-6" x 22'-0"
Scale of plan: 5⁄16" = 1'-0", 24" grid
Numbered arrows indicate photo locations
Illustration by Kellie Jaeger

➕ Find more plans online in the Trains.com Track Plan Database.


Pan Am to Bangor, Maine
Storage track
Allen Avenue
Morrill's Corner
I-95
Team track
Forest Avenue
Portland Boxing
Maingas
NEPW Logistics
BlueLinx
Warren Avenue
Bishop Street Extension
Bishop Street
Sunoco
Bishop Street Branch
Plasmine Technology
1190 Forest Avenue
Deering Junction
Abandoned quarry
I-95
Scale
0
1/4 mile
1/2 mile
Forest Avenue
Pan Am to downtown Portland, Rigby Yard, and (south) to Boston

© 2022 Kalmbach Media Co., Model Railroader magazine: Kellie Jaeger
Not all lines shown

Portland, Maine
(Some tracks omitted for clarity)

The layout at a glance

Name: Bishop Street Branch
Scale: HO (1:87.1)
Size: 10'-6" x 22'-0"
Prototype: Guilford/Pan Am Railways
Era: Late 1980s through the 1990s
Locale: Portland, Maine
Style: walk-in
Mainline run: none
Minimum radius: 24"
Minimum turnout: no. 6
Maximum grade: none
Benchwork: open grid
Height: 51"
Roadbed: ½" birch plywood with N scale cork
Track: Micro Engineering code 70 on the branch, code 83 on the main
Backdrop: painted walls
Control: NCE Power Pro-R wireless Digital Command Control

System's compact, but modelgenic, half-mile-long Bishop Street Branch. The layout is set in Portland, Maine, during the 1980s and 1990s.

Portland is a beautiful waterfront city steeped in railroad history. Even by railroad standards, the lines of this region have gone through numerous name changes, consolidations, and abandonments. Reading the history of the area and looking at the track charts, you certainly need a strong cup of coffee, a pen and notepad, and a highlighter to keep track of it all.

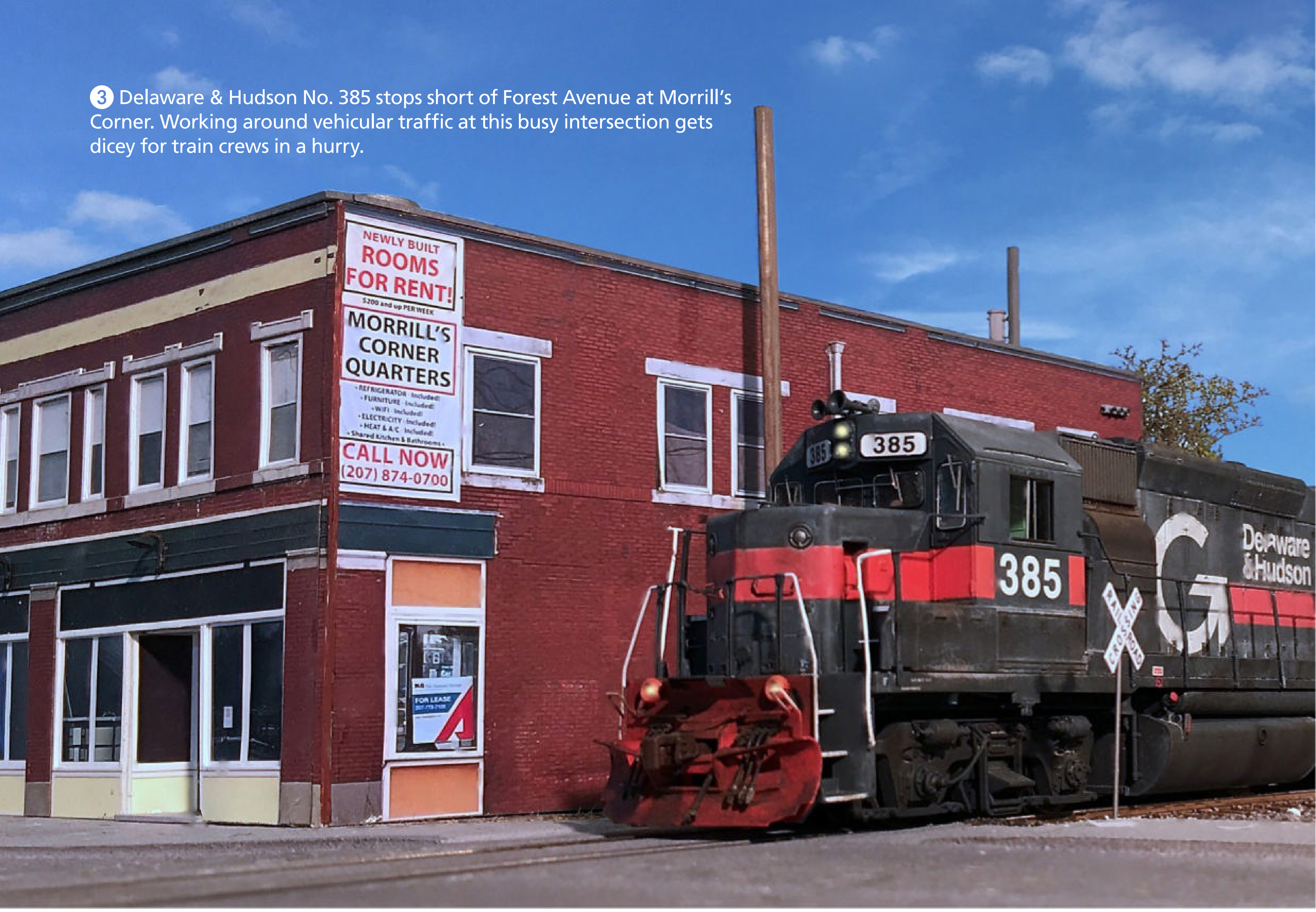
The Bishop Street Branch line splits off the Boston-to-Bangor main line at Deering Junction. In earlier years, Deering is where the Boston & Maine's Worcester, Nashua & Portland (WN&P) line came south from Rochester, N.H., and met the Maine Central's line to Bangor. As time marched on, and the nation's interstate system was built, the B&M segment was truncated and the remaining vestiges became the Bishop Street Branch. With consolidation came Guilford Rail Systems which, in a corporate branding move, changed its name to Pan Am in 1998. Pan Am was purchased by CSX in June 2022.

The branch itself only has a handful of industries now. Moving east to west, first up is Plasmine Technology, a paper products industry that produces surface treatment additives for the paper and paperboard industries. It receives tank cars and hoppers.

Next up is a concrete team track platform. I'm not completely clear on when service to the team track stopped.

Moving west, Maingas is a small liquefied petroleum gas (LPG) supplier that receives only a car or two.

At the end of the line is BlueLinx, a building products distributor (plywood, roofing, flooring, etc.) that gets boxcars and center-beam flatcars. It is now the only active customer on the line.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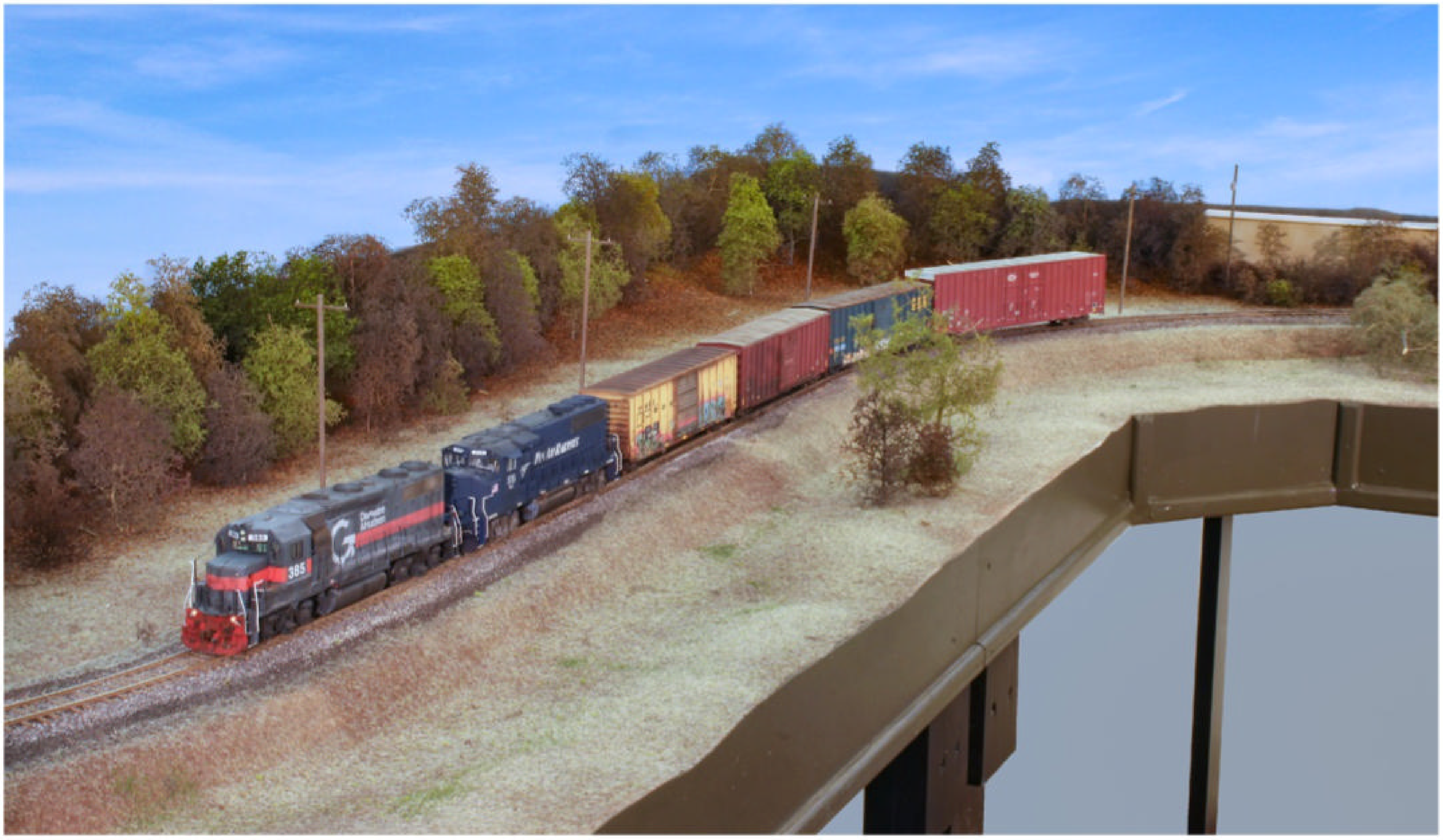
385
385
Delaware & Hudson
RAILROAD CROSSING

③ Delaware & Hudson No. 385 stops short of Forest Avenue at Morrill's Corner. Working around vehicular traffic at this busy intersection gets dicey for train crews in a hurry.



④ After crossing the Bishop Street Extension, the line goes through a heavily wooded area. This train, on its way to building products distributor BlueLinx, is led by locomotives painted for Guilford and Pan Am Railways.

Not on the branch specifically, but on the east side of the main and a few hundred yards to the southeast of Deering Junction, is NEPW. The massive logistics warehouse campus is still served and receives boxcars.

Scenically, there's a distinctive abandoned granite quarry next to NEPW. Since the quarry is such a signature element stating "this is New England" I felt it was important to represent the former industry on the layout.

Custom building

In most ways a custom-built layout is the same as what you'd build for yourself. There are some differences, though. The model railroad needs to be built so that, when completed, it can be broken down into sections, loaded into a truck or container, transported to the site, and reassembled. This needs to be done so the sectional approach isn't apparent after reassembly.

Second, the model railroad must be built fairly quickly while at the same time maintaining high standards of appearance and reliability. A traditional hobbyist has the luxury of seeing their dream come together over decades. No customer will wait that long. Systems need to be in place so projects can be finished, on average, in six to 12 months.

Finally, custom-built layouts need to be constructed to higher standards of mechanical reliability than a typical home railroad. While return visits to a site for minor repairs are occasionally necessary, doing so is extremely expensive. Custom model railroads are built to be fairly bulletproof, largely eliminating such trips.

Is custom building for you?

Who are my customers? Primarily business owners, professionals, executives, and retirees. About half have no building experience. Surprisingly, the other half are accomplished modelers who, for whatever reason, want me to build their specific project. This was the case with the Bishop Street Branch.

Dan Mills, the customer, already built his own version of the line. To my eye, the layout was well done. The custom-built project he wanted me to do was to replace what he had built. Dan is interested in slow speed, prototype switching operations. He wanted a platform to accomplish that and to do so against the background of the charm of historic Portland, Maine.

Although Dan had room for a larger model railroad, his work and family life involve a large time commitment. For lifestyle reasons he wanted to keep the layout size and scope manageable and on the smaller, simpler side.

The custom building process

In many ways, the process of having a custom layout built is similar to that of building a custom home or putting a large addition on an existing house. The first step is preparing a layout design. Every project I've ever built was something I designed as well.

Once the design is done, a cost proposal is prepared. If that's accepted, a contract is signed, and work starts. Before cutting the first board I always fly out to the customer's location to look at the site, meet them, and verify all of the room measurements.

With the Bishop Street Branch, there was the added bonus that the prototype is located close to Dan's house. That gave us the opportunity to walk the Bishop Street Branch together, which was particularly enjoyable.

If you have the luxury, prototype site visits add an entirely new dimension to creating a successful design. You may have noticed how different your theme looks in person as opposed to how it appears in photos or the pages of a book. That's because there's a big difference between the camera lens and the human eye. For this reason when the opportunity presents itself, I make a site visit to see as much of the line with the customer as I can and have them walk me through their vision.

As is always the case, a lot of things stood out when I saw the Bishop Street Branch in person. Deering Junction is located in a historic neighborhood called Morrill's Corner. It became apparent that Morrill's Corner was a center of action and should be the focal point of the layout.

Track on the Bishop Street Branch is pretty ragged, rated for 10 mph with ballast in a variety of colors. In person, I noticed how much this contrasted with the pristine mainline.

Not apparent in photos is the Portland Boxing Club, located in a century-old factory with a towering smokestack

Rocky Hill I
41 Quarry Road
Entrance
Rocky Hill II
118 Quarry Road
NEPW
LOGISTICS
385
385
385
Delaware & Hudson

⑤ The NEPW Logistics warehouse has 11 rail-served doors. Each car needs to be spotted at a specifically designated door, making this industry fairly involved to switch.

next to the main. They've made the shrewd advertising move of emblazoning the smokestack with Boxing on three sides. After my visit to Portland, Maine, I realized how important it was to incorporate this on the layout.

Design and operations

The key to a successful design is to know precisely what you want the layout to do for you before you jump to making sketches on a napkin. You need to be clear on whether you want casual mainline rail fanning, switching operations, or a 3-D piece of artwork that you can look at. When you're clear on that, your choices are to do a few things exceptionally well or try to do a lot of things in highly compromised form.

What's next

January: Meet the Bishop Street Branch
February: Benchwork, track, and wiring
March: Scenery
April: Structures

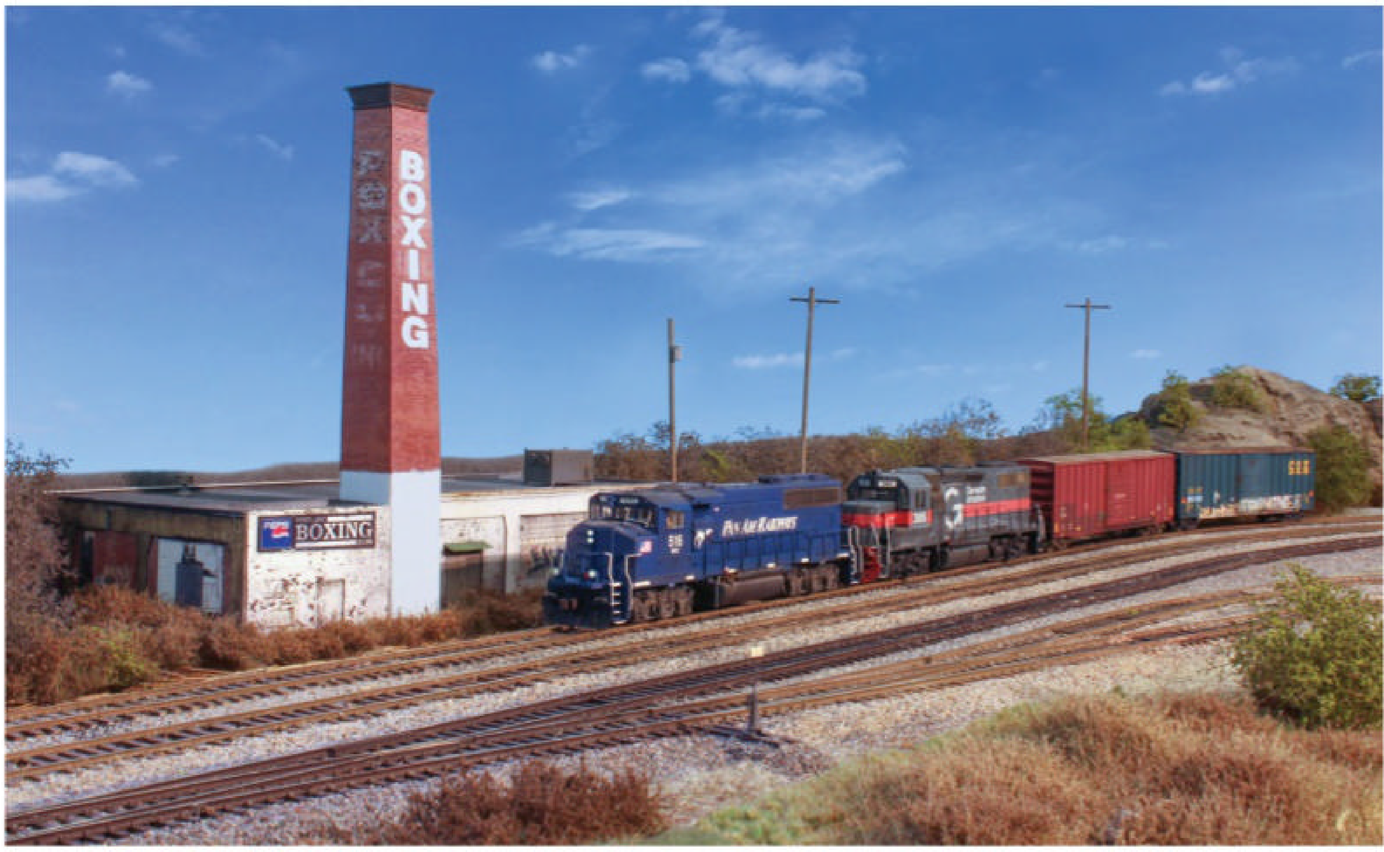
Although I was the one who constructed Dan's second version of the branch, I credit his strategic vision for the ultimate success of the layout. He was clear on what he wanted, and that was a model of the Bishop Street Branch. Nothing more. No mission creep. No overreaching in terms of scope.

Dan's primary interest is slow-speed switching operations. He envisioned operating sessions to be 30- or 40-minute affairs run by him and his kids. Given Dan's limited time, he didn't want to be dealing with all of the track cleaning and maintenance a large railroad would entail.

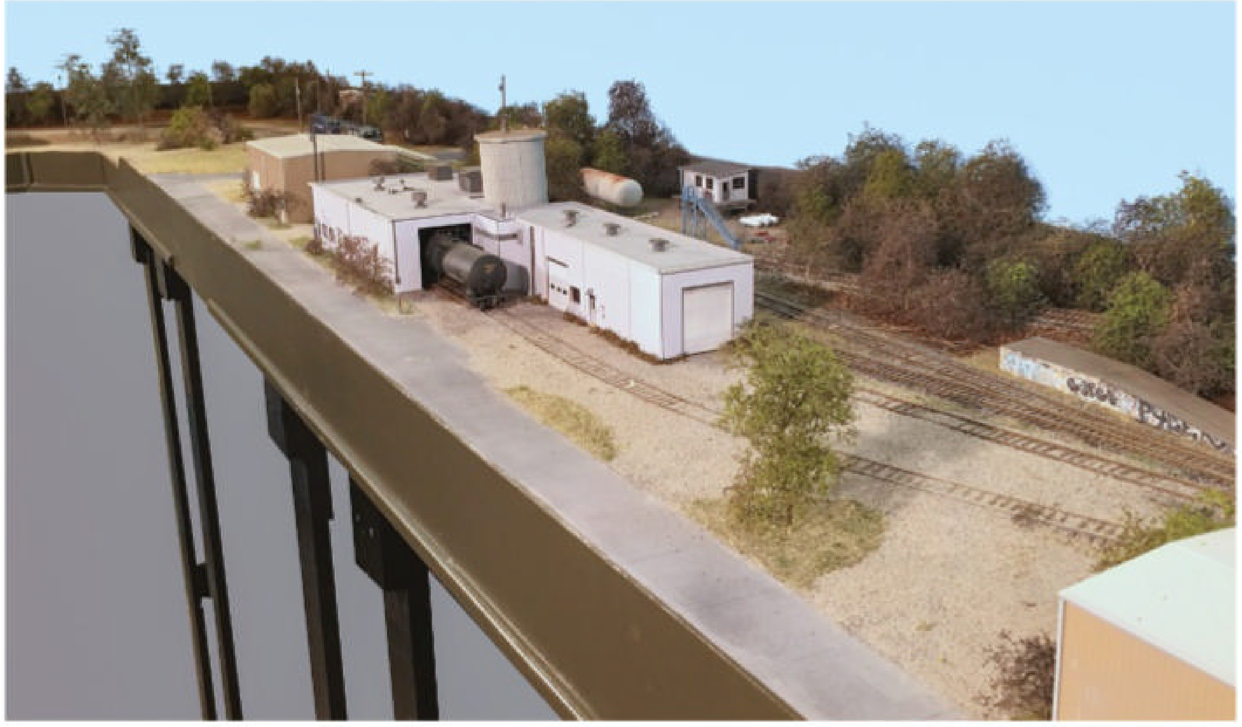
Dan designated a 10 x 20-foot section of an upstairs den for the layout. When operated according to prototype practices, it doesn't take many turnouts, industries, or track to spin off such a 30-minute session. The track on the branch has deteriorated to the point where this a 10 mph slow order throughout, so running at those speeds adds more time to an operating session.

Short stub branches lend themselves particularly well for modeling in our always-too-small spaces. Since we're modeling one location, we were able to accomplish all of the operational goals while also allowing lots of room for scenery and avoiding the overly congested model railroad look. The branch's track arrangement is simple enough that we were able to model it fairly accurately. Even so, the size and shape of the space dictated swapping a few turnouts here and there.

The original plan was to model just the branch. However, since nearby



⑥ No matter where you look in Morrill's Corner, the iconic Portland Boxing Club smokestack is always on the horizon. Here we see the local blocking cars before shoving into the NEPW Logistics complex. Lance added the sky background with photo-editing software.



⑦ The line's namesake, Bishop Street, runs along the front edge of the layout. In the foreground is Plasmine Technology, an industry that produces surface treatment additives for paper and paperboard. Maingas and the concrete team track dock can be seen in the background.

NEPW Logistics offered so much operational potential – and the benchwork footprint allowed the room – I encouraged Dan to include that as well.

In the real world locals come out of Rigby Yard in downtown Portland, make the few mile trip north to Morrill's Corner, and work either the branch, NEPW, or both. Since there's only one train, and we had limited space, we didn't include staging. An operating session is assumed to begin with a train having just arrived in the area.

The NEPW Logistics complex is massive and we've modeled some of its warehouses totaling eleven loading doors. The industry is car-spot dependent, meaning specific cars need to be put in front of designated doors, extending the length of op sessions. Operationally, NEPW's 11 loading bays are the equivalent of 11 separate industries.

BlueLinx and Maingas aren't car-spot dependent. I'm not sure about Plasmine Technology. Photos show off-spot cars on the main next to Plasmine. This happens when a train arrives but no space is available to receive incoming cars. Because of this, they're left nearby (off spot) to be spotted at a later date when space becomes available.

Time to get started

With the background information covered, we're ready to start work on the model railroad. Next month I'll delve into construction of the mechanical aspects, including benchwork, track, and wiring. See you then! MR

Meet Lance Mindheim

Lance Mindheim owns The Shelf Layouts Co. (shelflayouts.com), a custom layout building and design firm. He models urban industrial switching railroads and presently has three layouts. In addition, Lance writes frequently for the hobby press. He lives in Silver Spring, Md., and has one grown son, Zachary, who often accompanies him to model railroading events.

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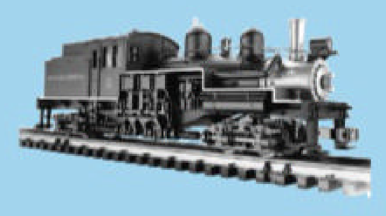

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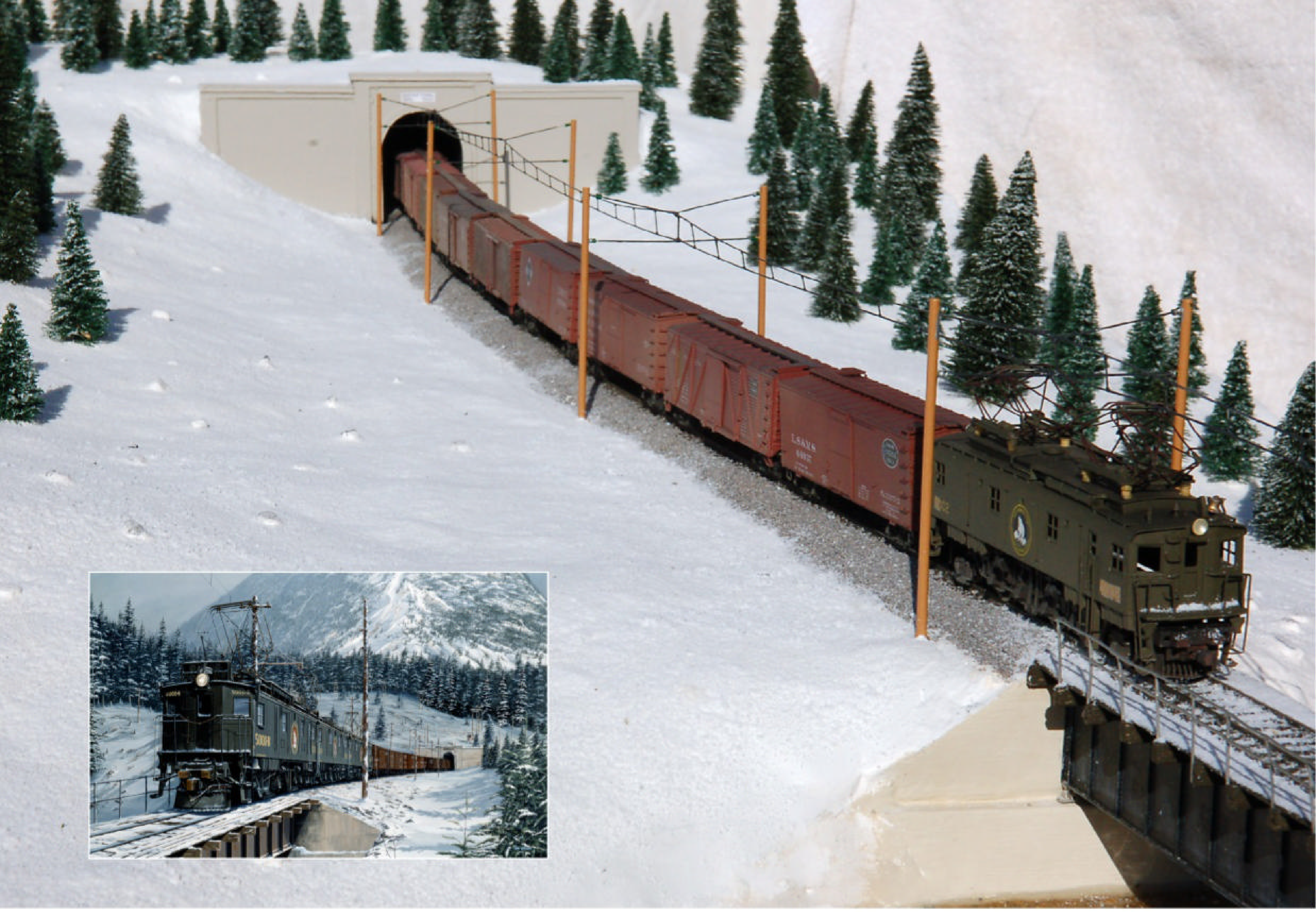


Inspired by "Westbound Electrics," a painting by railroad artist Jim Jordan (inset), Great Northern Ry. fan Jim Rohrbach built and scenicked this wintry HO scale diorama to replicate the scene in the painting.

Creating a work of art

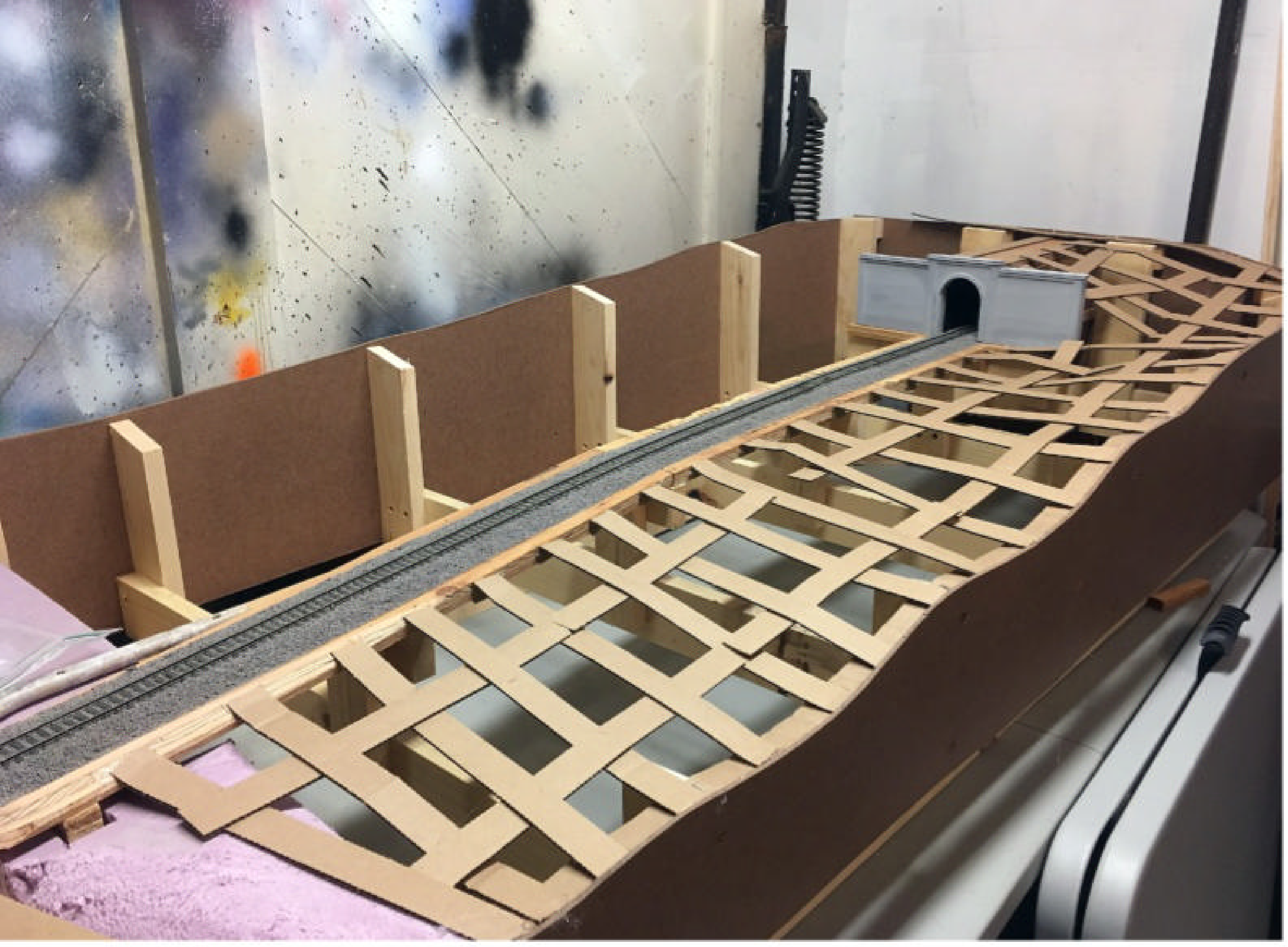
Jim Rohrbach's Great Northern diorama was inspired by a railroad painting

By Jim Rohrbach • Photos by the author

When asked about their relationship with trains or model railroading, some people may reply that it "runs in their blood." In my case, it really is true. My maternal grandfather, Clyde Price, was a veteran conductor with the Great Northern in the 1910s, '20s, and '30s. My mother presented me with a couple of his "passes" dated 1936 and 1937 and some buttons from his uniform before she died in 1979. When we were about 5 or 6, my late brother and I received an American Flyer train set from our dad (I still have it). We also each got Athearn sets some years later.

In the late 1960s, I took the hobby a bit more seriously. The railroad my grandfather worked for is the one I chose to model. I picked up a Pacific Fast Mail catalog at Bart Austin's "Trains, Nothing But Trains" in San Mateo, Calif., and several hundred dollars later, I was the proud owner of a few GN brass locomotives by Tenshodo. I didn't have a layout of my own, so I ran them on the Peninsula Model Railroad Association's track at the San Mateo County Fairgrounds. A nice article about the club appears in the August 1985 *Model Railroader* magazine.

In 1968, when I was 20, I joined the National Model Railroad Association and was active in the Pacific Coast Region, Coast Division. I enjoyed building and painting HO scale locomotives for their contests and running them on the club's layout. I never had a real layout of my own, so getting in on the ground floor by helping to construct the club's new layout was a great experience.
I especially remember grinding points



Jim ripped 1 x 6 dimensional lumber into thinner planks to frame his diorama's benchwork. He realized after applying plaster cloth to his cardboard-strip terrain that he spaced the strips too far apart.

for Wade Pellizzer (photographer of the cover for the above-mentioned article) as he prepared to hand-lay switches in the club's first yard.

These days, my teachers are the videos on Trains.com and many, many *Model Railroader* articles. Watching David Popp make L-girder benchwork and Cody Grivno explain how to complete scenery inspired me to build a diorama based on a Jim Jordan painting, "Westbound Electrics," a print of which had been given to me as a gift.

Beginning construction

I had the fortune to visit the west portal of the Cascade Tunnel several times when on vacation visiting relatives who lived east of Seattle. Many photographs and rough estimates in size and scale aided me in planning the benchwork for the diorama.

I ripped down 1 x 6 pine boards to build the L-girders, risers, and subroadbed on which to lay the track. I first painted the Code 83 nickel-silver flextrack with Testor's Model Master Railroad Tie Brown. [The Model Master line is no longer produced by the Testor Corp. – *Ed.*] I then spiked it onto cork roadbed. Woodland Scenics Scenic Cement held the ballast in place.

I purchased a Micro Engineering trestle, painted and drybrush weathered it, and set it on concrete abutments of balsa wood to span Surprise Creek. The tunnel portal face was constructed using a scrap piece of ½" plywood with scale lumber pieces and cardstock simulating the concrete ledge details. I didn't like the look of commercial "concrete" paints and ended up using Kelly Moore's "Birch Gray," which is the color of our house.

I experimented with font sizes in Microsoft Word to create the sign above the tunnel entrance. When I achieved the right look, I printed it out, trimmed it to fit, and used Aleene's Tacky Glue to put it in place.

Terrain and scenery

The hillsides were created using cardboard webbing and plaster cloth to make the hardshell. I initially placed the cardboard webbing too far apart before laying on the plaster cloth, so the hillsides looked like a big, white waffle! Some thin coats of Hydrocal and plaster smoothed things out. I glued on individual pea gravel pieces to simulate large rocks and then coated them with a thin plaster wash to give them a "settled in" look.

Even though the project took me nearly four years, I think it was a worthwhile endeavor.

The riverbanks are shaped pieces of extruded-foam insulation board covered with Sculptamold and plaster. To make the riverbed and resin water, I followed David Popp's instructions in the "Thin Branch" project series on Model Railroader Video Plus. A couple of pours over a bed of brown "path fines" created a satisfactory looking river. After the bridge was installed, I scratchbuilt a railing using Evergreen styrene strips.

Building the catenary system was next. Being a member of the Great Northern Railway Historical Society allowed me to obtain several of its reference sheets on the electrification of the railroad. I also have copies of Charles Wood's *Lines West* and *The Great Northern Railway*, written by Charles and his wife, Dorothy. Both of those gave me photos and text which I could use as a resource in building the catenary.

I purchased the catenary pieces from Model Memories (modelmemories.com). Following their enclosed instructions and referring to the GN Historical Society bulletins, I built and installed the towers and wires. I built some jigs to hold the wire at the correct height while soldering the pieces together. Without the jigs, the process would've been much harder, but I was happy with the result.

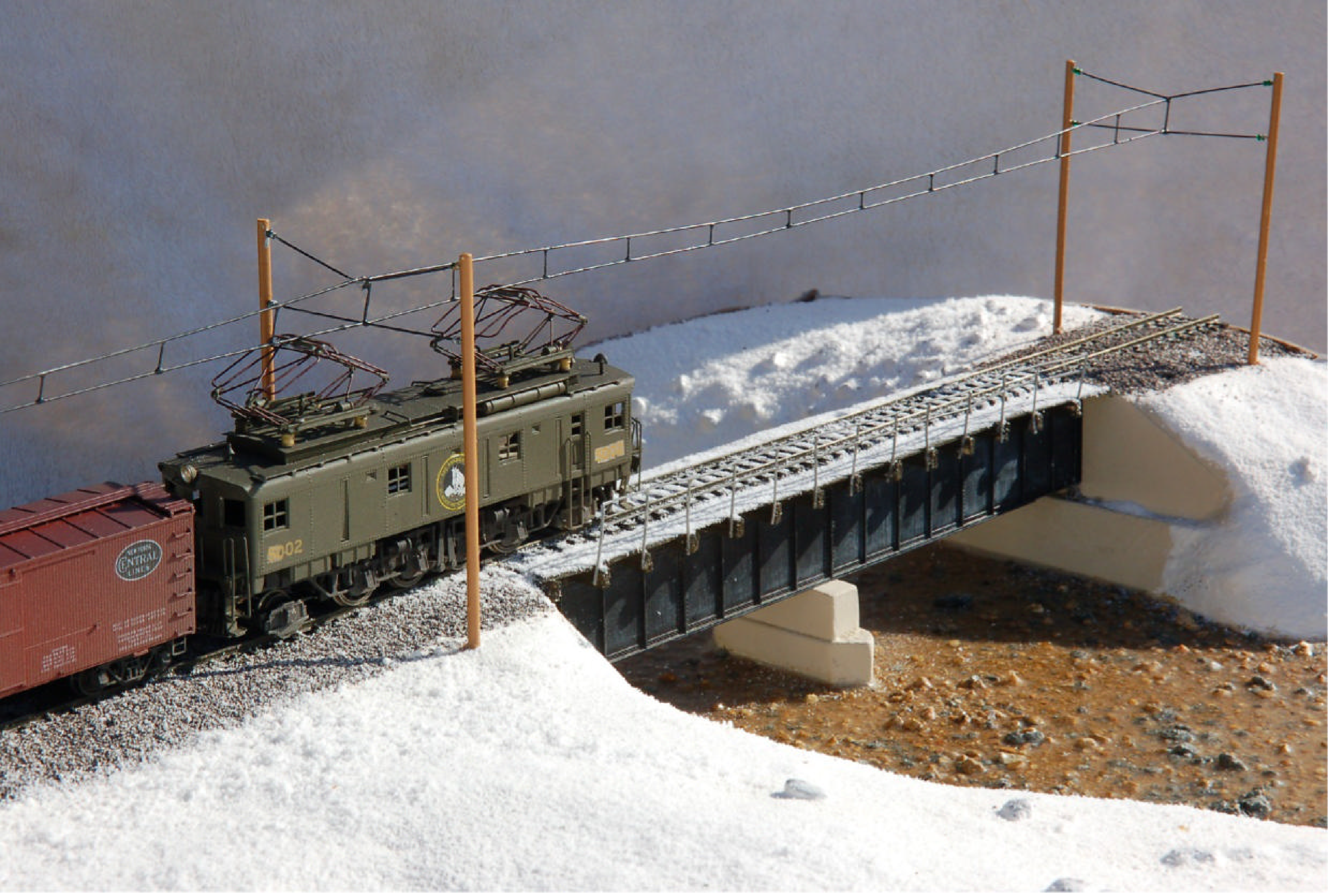
Before I could place the trees, I needed to cover the terrain with snow. I followed the directions on a YouTube video supplied by Woodland Scenics, first spraying Scenic Cement and then sprinkling their Snowflake Snow (item No. SN140) on the ground, followed by a sealer coat of Scenic Cement.

The trees are from Heki. They were dusted with the same Snowflake Snow, and after drying, placed around the diorama following the locations shown on the painting.

Adding a train

The class Z-1 electric locomotive is a brass Suydam unit I purchased on the auction website eBay several years ago. Unfortunately, one is all I could afford, as the cost of brass has gone up, and adding the other two shown in the painting would break my budget!

After disassembly, I cleaned the entire locomotive and carefully washed it in soapy water. After rinsing and letting everything dry completely, I primed all the parts and then painted the body and running gear in the correct paint scheme, black for the running gear and



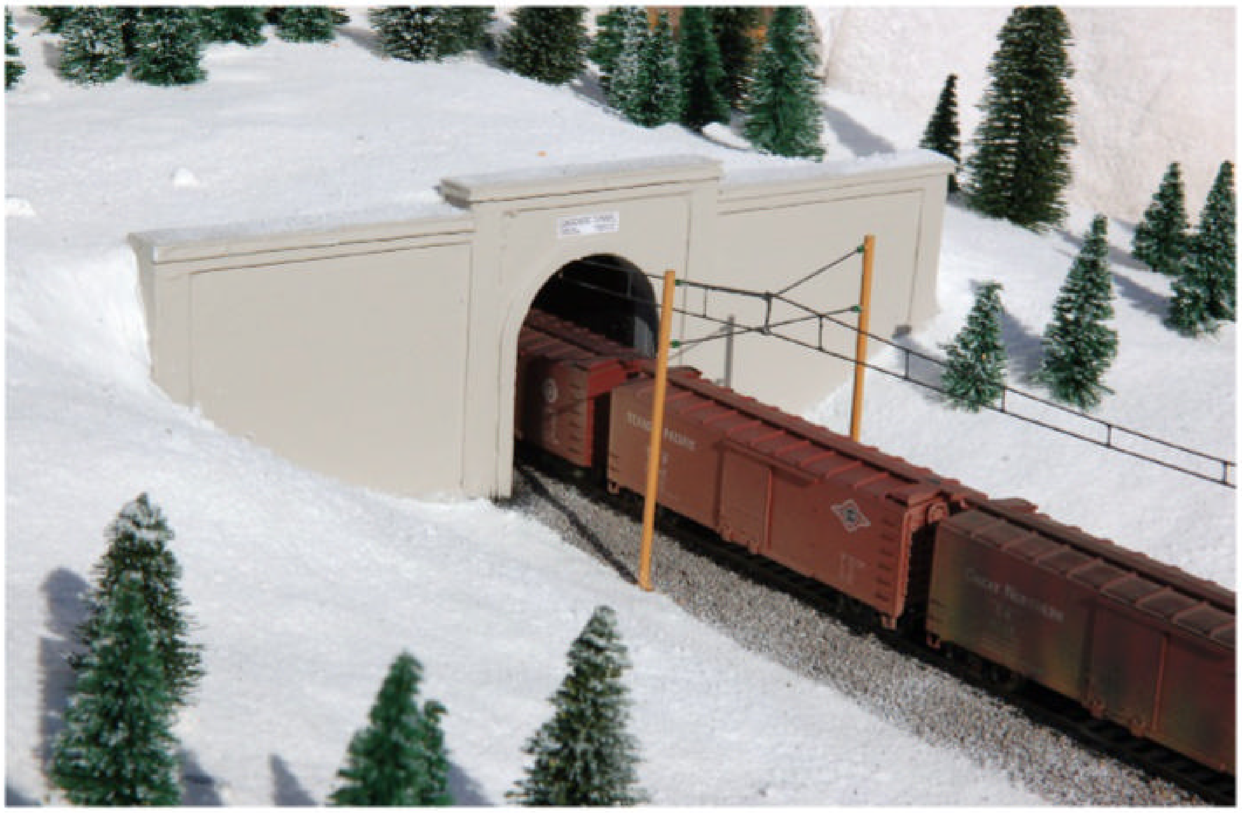
Jim built his catenary based on information from the Great Northern Railway Historical Society and books about the GN, using parts from Model Memories. The locomotive is a brass Suydam model.

Pullman Green for the body. I used Champ decals for a Y-1 electric (since I couldn't find any Z-1 decals) and a Microscale "goat" herald.

Some airbrushing and light dry powder weathering gave the locomotive a used look. In addition to my already owned cars, I purchased some Accurail cars to make up the train's length. They were also weathered to a used condition.

Even though the project took me nearly four years, I think it was a worthwhile endeavor. Now that I have a "train to nowhere," I'd like to build a small switching layout on which to run my Walthers Great Northern SW1200 and continue to work on my modeling skills.

I'd like to thank my wife, Cheri, for allowing me to take up the garage for all the time it took to complete the project. I'd also like to thank a fellow teacher at St. Timothy's School in San Mateo, Calif., for checking my document for spelling and grammar and all the rest of the teachers there for putting up with my periodic updates on the diorama. MR



Jim scratchbuilt the west portal of Cascade Tunnel from plywood, scale lumber, and cardstock. He painted it with concrete-colored house paint and created the sign on his computer.

Jim Rohrbach retired from AT&T after more than 30 years, then taught computers at the elementary school level for 14 years. He now works at Trader Joe's and may actually retire in a few years. Jim has been married for 46 years. He and his wife, Cheri, have three grown children and five grandchildren, with another on the way.

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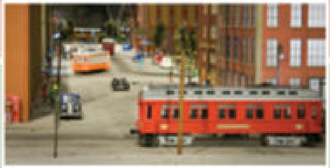

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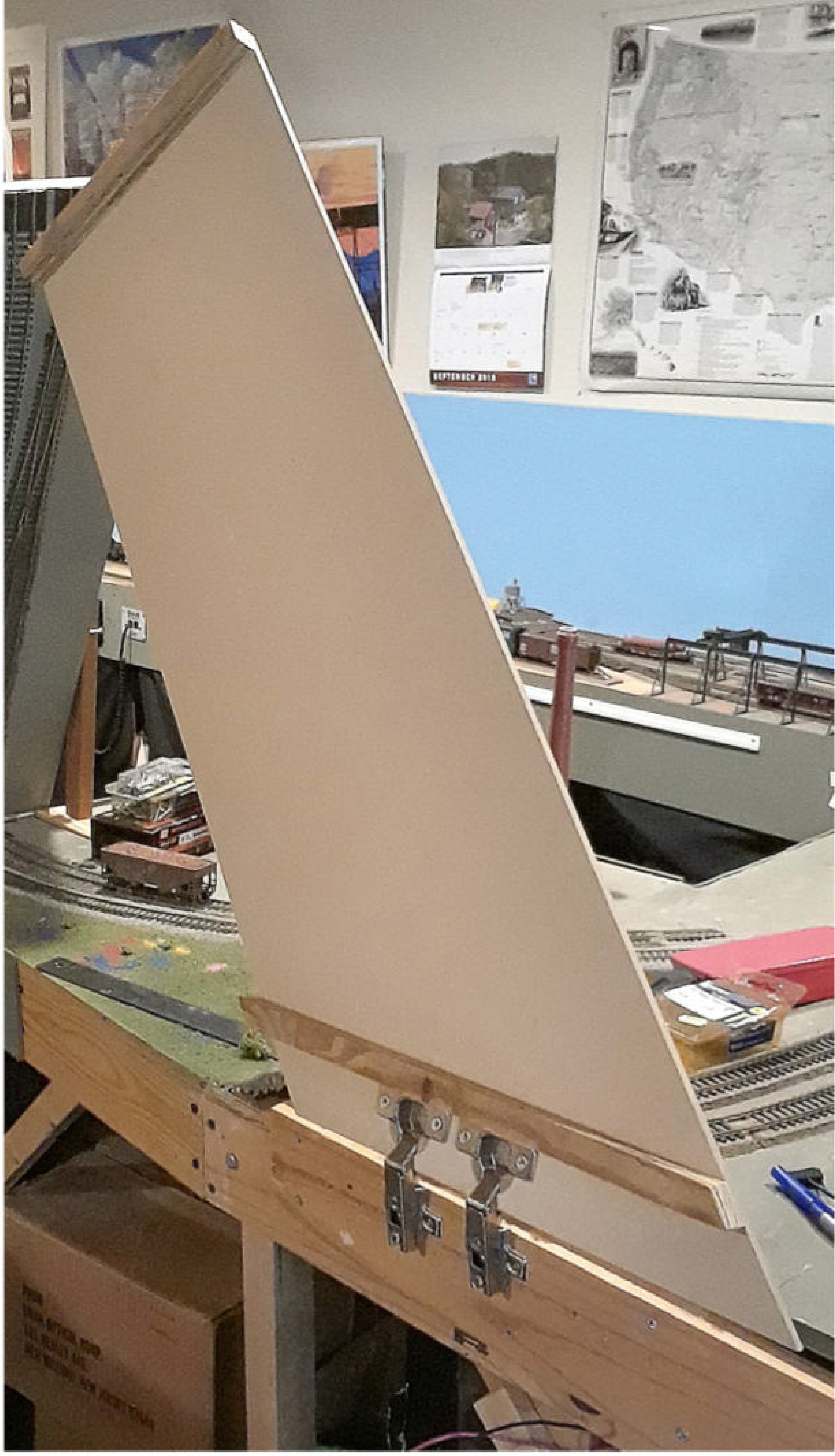
A fresh approach to lift-up sections

Euro-style cabinet hinges provide bind-free operation and can be hidden under the layout

By Don Winn • Photos by Gary Phelps



Many lift-up sections have hinges on top of the layout, detracting from the model railroad's realism. Looking for a better solution, Don Winn used Euro-style hinges, which can be installed below the layout.

Most modelers aim to design a walk-in layout to avoid duckunders, liftouts, swing gates, and other pieces of benchwork that impede travel. But the needs of visitors and operators are often prioritized below that of the trains. We're willing to make compromises in our quest for an optimal track plan.

The track plan for my new model railroad includes a section where the mainline crosses an aisle used by three operators who are working on branch lines. I ruled out a fixed duckunder. Some operators and visitors lack the flexibility to comfortably bend down to clear a duckunder. Further, I wanted to keep the space open when working on the railroad between operating sessions. Not using a fixed duckunder also makes it easier to move items in and out of storage below the layout.

A simple liftout was also ruled out. A liftout needs to be set down somewhere, which is too often on the layout where it may damage scenery, structures, or rolling stock.

With those two options off the table, I narrowed my list of options down to a swing gate, a hinged drop leaf, or a hinged lift-up section. I selected the last one.

Hinged lift-up sections provide a hard stop for trains in one direction. In addition, they offer an extra bit of protection for scenery and structures when operators and visitors pass through the opening.

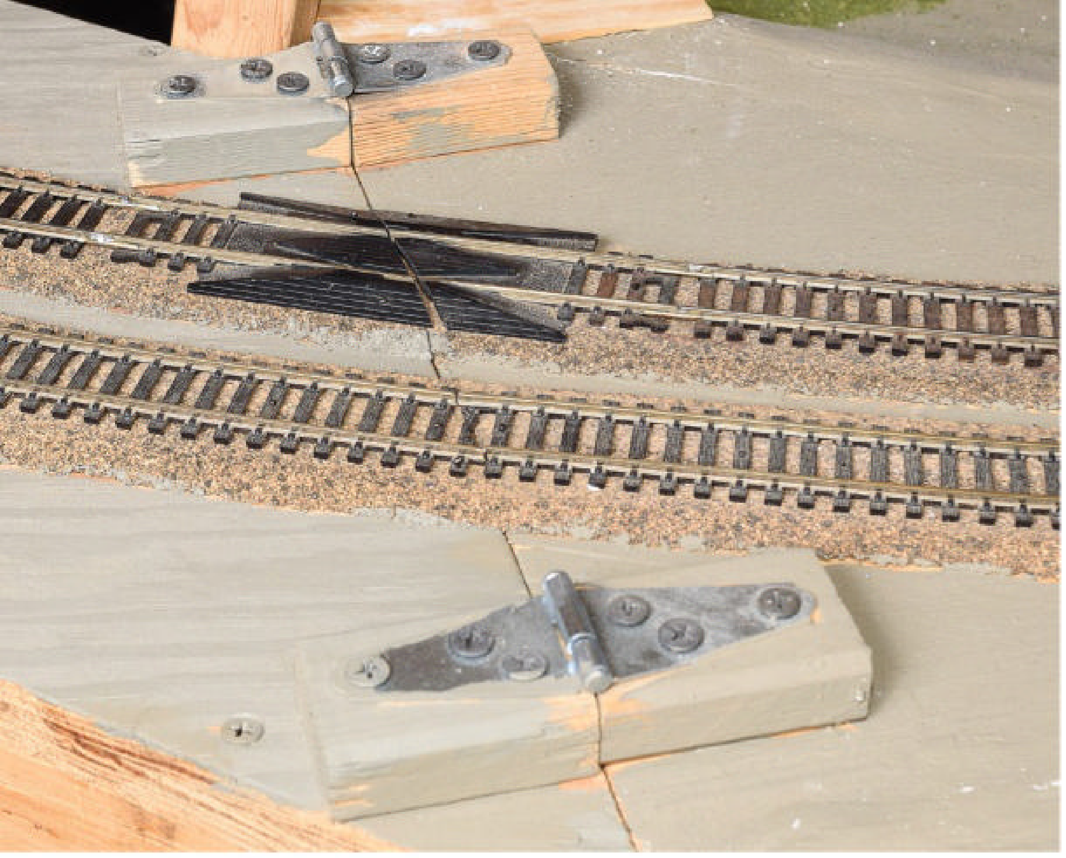
Learning as you go

When I visit layouts during open houses and operating sessions, I'm on the lookout for how other modelers have addressed construction challenges. Many lift-up sections have hinges on top of the benchwork, which detracts from the realism of the scene (see ① on the next page).

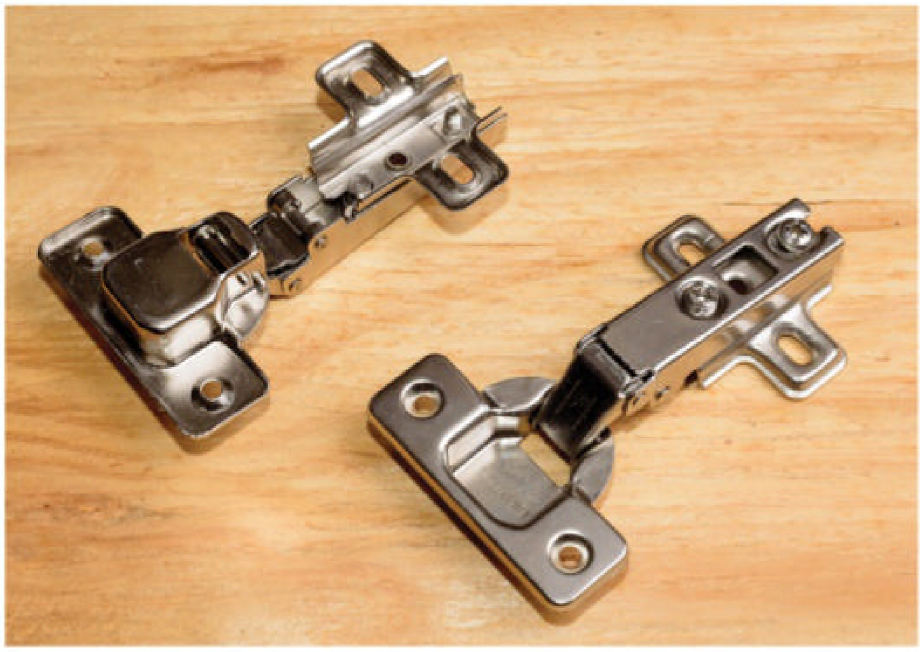
The mechanics of a standard hinge require the pin to be above the rail height, or else the rails on the lift-up section would crush against the track on the layout. I did some head scratching and wondered if there was a better way to raise and lower the lift-up section.

Around this time, I moved into a new house. To save money, I installed the cabinet and drawer pulls in the kitchen and bathrooms myself. Spending all of that time around cabinet hardware (time I could have spent building my layout), I noticed a new style of hinge.

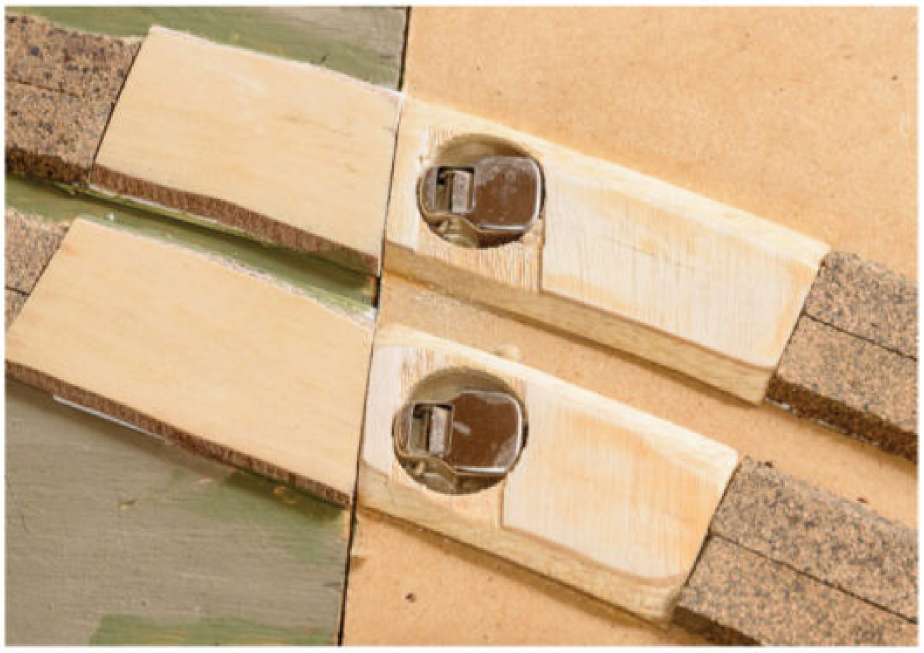
Old-style cabinet hinges, like those shown in ①, are visible from the outside and use a simple hinge. Euro-style hinges, found on most new cabinets, are hidden and feature a double-hinge design (see ② on the next page). The double hinge allows the cabinet door to fully overlap the opening, but open in a way that keeps it from binding.



① **The old way.** While attending operating sessions and open houses, Don noticed many lift-up sections used standard hinges. Because of their design, the hinges have to be mounted on top of the layout.



② **A better solution.** Don found Everbilt 35mm 110-degree full-overlay cabinet hinges worked the best for lift-up sections. Though there are other Euro-style hinges on the market, not all of them are alike.



③ **Concealing the hinges.** Don used 5mm lauan plywood for roadbed where the lift-up section meets the layout. Don concealed the cup section of the Euro-style hinges in the plywood roadbed.

Four keys to lift-up sections

- Recess the hinges so they're flush with the bottom of the ties (HO scale and smaller).
- Install two or more hinges to eliminate wobbling when the lift-up section is raised.
- Use Everbilt 35mm 110-degree full-overlay frameless hinges or equivalent. There are a lot of hinges out there that look the same but vary in how they articulate.
- Avoid any grade changes at the ends of the lift-up section. – *Don Winn*

Testing hinges

Curious, I picked up some Euro-style cabinet hinges at my local home improvement store and constructed prototype lift-up sections.

As I researched hinged lift-up sections on the internet, I discovered posts by other modelers who had tried using cabinet hinges. Many reported their lift-up sections would bind. This led most to abandon the concept and try other solutions.

After building a number of prototypes, I discovered through trial and error what had stalled out the attempts I had read about on the internet. The binding was caused by the combined thickness of the roadbed and benchwork.

I found that the Euro-style hinges will work only if they're placed on the same plane as the ties (in HO and smaller scales; larger scales may need the hinge at the bottom of the rails). If the hinges are placed any lower than that, greater gaps must be cut between the layout and lift-up section to prevent the rails from binding.

I also learned that not all cabinet hinges are alike and that most of them will not work. In my research I discovered that Everbilt 35mm 110-degree full-overlay frameless hinges provide the articulation needed to keep the rails from binding ②. The hinges are available at The Home Depot and are relatively inexpensive, priced at around $6 a pair. The hinges are available in soft-close and self-close versions. The latter works better for model railroad applications.

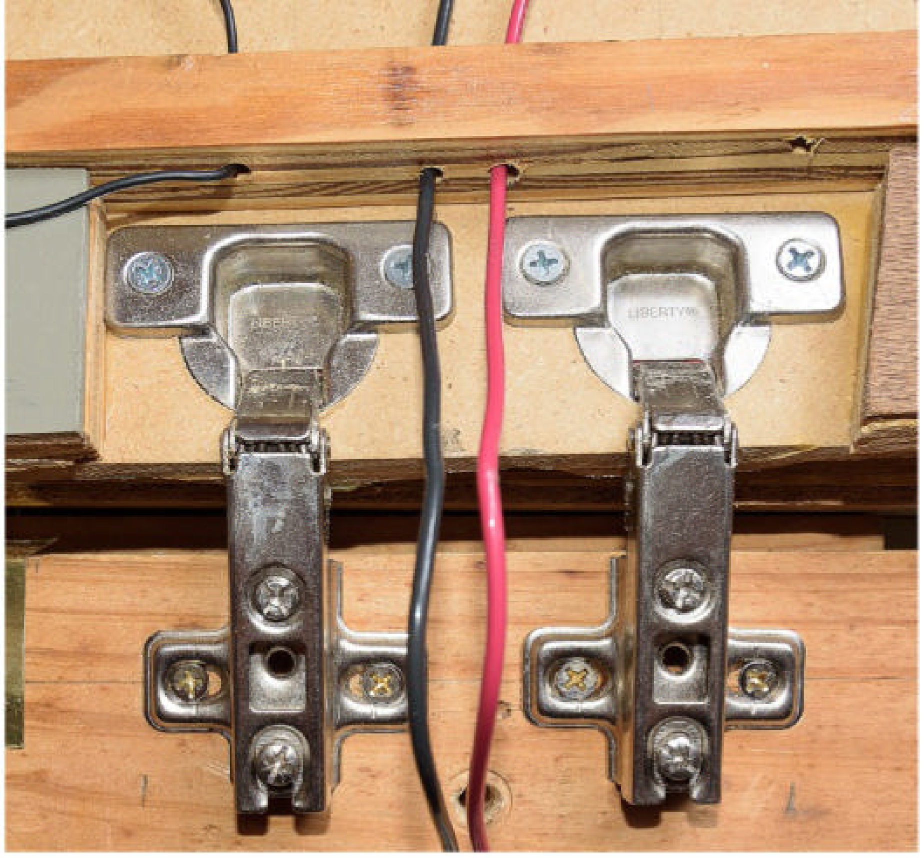
Building lift-up sections

The hinges need to be installed in material at least .45" thick. This provides sufficient room to recess the cup portion of the hinge. On a model railroad, that works out to a ¼" base with 5 mm roadbed. Here's the method I used to construction lift-up sections.

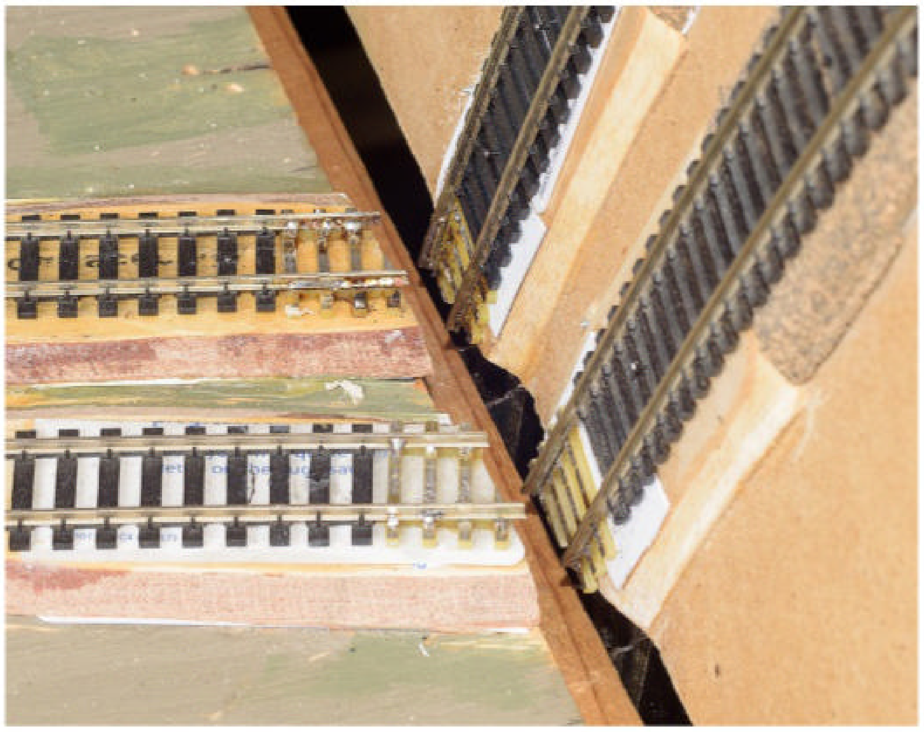
First, I cut a piece of ¼" medium-density fiberboard (MDF) for the lift-up section. Though heavier, I prefer MDF over plywood as it's stronger and more consistent. Then I marked the centerlines of the track.

Next, I cut 3" pieces of 5mm lauan plywood and attached them with wood glue. The lauan acts as roadbed at the edges of the layout and lift-up section. Conveniently, the lauan matched the cork roadbed in height. It also provided a more stable platform for attaching track.

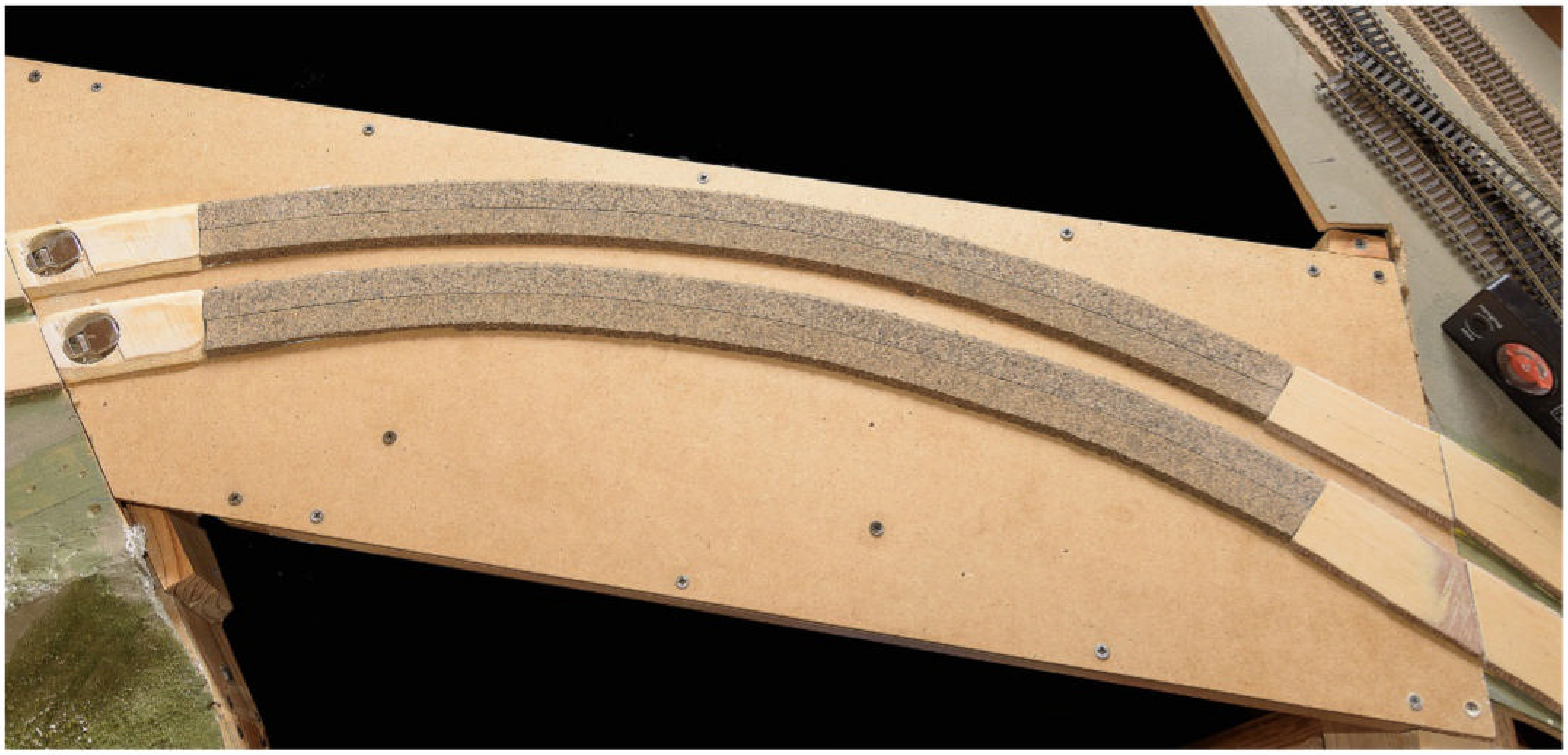
I then marked the location for the center of the hole for the hinge. Alternatively, I could have used the paper template included with the hinges. Then I drilled 35mm (1⅜") holes through the lauan and MDF. Drill carefully through the lauan to avoid splitting the material ③.



④ **Final installation.** This under-the-layout view shows how the hinges are attached to the lift-up section (top) and layout. Don drilled pilot holes for all of the screws before attaching the hinges to the plywood and Homasote.



⑤ **Printed-circuit board ties.** To help keep the rails aligned between the layout and lift-up section, Don attached the rails to Gaugemaster ties. The printed-circuit board ties are produced by American Tie & Timber Co.



⑥ **A versatile solution.** The tracks can be curved or straight relative to the joint on the lift-up section. Two Euro-style hinges were used on this lift-up section. The cup section of the hinges is visible at left.

Next, I installed the hinges in the lift-up section. I drilled pilot holes for the screws before installing them. I glued bracing to the bottom of the lift-up section to give it extra rigidity.

Then I lined the lift-up section flush with the mating section of layout. I marked the location for the mounting screws, drilled pilot holes, and fastened the hinges ④.

Before installing the track, I soldered Gapmaster ties from American Tie & Timber Co. (americantieandtimber.com) at the edges of the layout and lift-up section ⑤. Attaching the rail to the Gapmaster ties, which are then glued to the lauan roadbed, helps hold the track in gauge.

I aligned the track with Ribbonrail gauges and fastened it with white glue. An alternative method would be to lay down a full section of track across the joint and cut the track after the glue had dried. As the lift-up section is raised, the rail sections pull away from each other without making contact.

Practical application

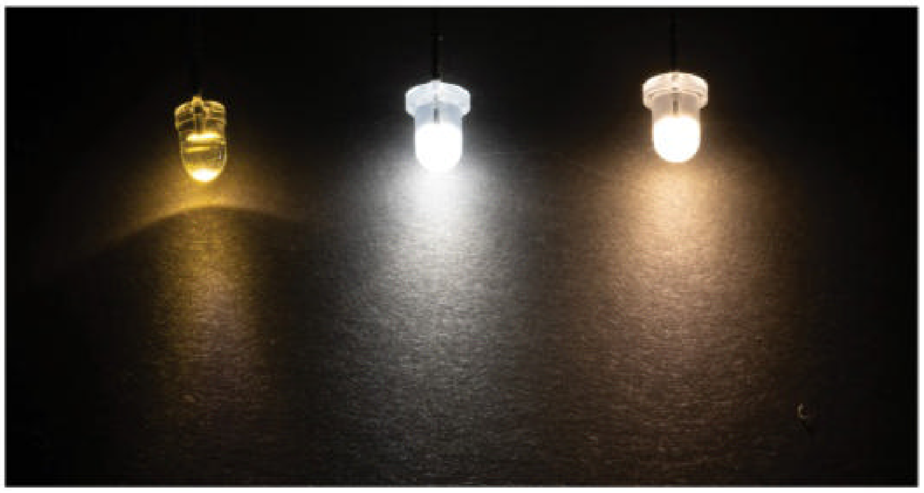
My friend George Zapalac offered to try a hinged lift-up section on his HO scale layout. Note that the track can be angled or curved relative to the lift-up joint ⑥.

The hinges were easy to conceal on George's layout because the line is double-tracked. In a single-track setting, you could hide only one hinge under the rail. I'd recommend adding another hinge or two for stability. The other hinges would create a bump of only 5mm, which could be covered with scenery.

Euro-style cabinet hinges are a great solution for lift-up sections. They're readily available, economical, and let you keep the mounting hardware off the layout surface. MR

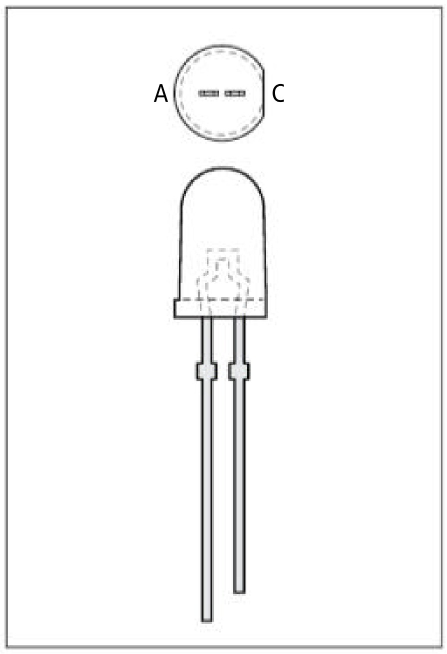
Don Winn lives in San Antonio, Texas. This is his first byline in Model Railroader *magazine.*

Shining light on light-emitting diodes



① Left to right: NCE (ncedcc.com) WWLEDx20 Warm White, SoundTraxx (soundtraxx.com) No. 810133 Sunny White, and SoundTraxx No. 810134 Golden White. Allan Gartner put a 1,000 ohm resistor in series with each of the LEDs shown here. You can change the resistor value to control the LED's brightness. The LED from NCE is more "point source" than the "diffuse" LEDs from Soundtraxx.

Now that light-emitting diodes (LEDs) are illuminating our homes, it's hard to not know something about them. While the kind of LEDs that light our homes have additional circuitry that allow them to run off of 120 volts, all LEDs are efficient and run much cooler than their incandescent predecessors. Most last virtually forever.



② The flat side and corresponding short lead is the cathode on an LED. This goes to the negative power source, like the function lead from a decoder. The long lead is the anode and goes to your positive power source, like the blue function lead. Don't forget a series resistor.

Those of us who grew up using incandescent light bulbs (contains a filament and gets hot) are used to "white" lights having a "warm" tone to them. Fluorescent lights have long come in various shades of white, but were not used for headlights in locomotives or automobiles. Since the demise of incandescent light bulbs, LEDs and other technology lights have become available in various shades of white known as color temperature.

To avoid specifying color temperature, some hobby suppliers try to give the shade of white a name. While well intended, I haven't found the names to give me a good idea of what shade of white I'm getting. There's nothing like seeing the actual LED lit up. I have provided a photo comparing several different LEDs to give you an idea of they look like ①.

What color temperature do you want? If you're modeling the steam era, you want a warm white LED for the headlight, cab light, marker lights, and number boxes.

Modern diesels likely use something other than incandescent lights. If you're fortunate to live somewhere where you can see your favorite railroad in action, you can compare headlights, ditch lights, and number boards with LEDs that you can buy.

Bipolar LEDs come in two configurations and are typically red/green. Some have two leads and light red when current flows in one direction and green when the current is reversed. Some bipolar LEDs have three leads where one is a common, one for red, and the third for green. The two-lead bipolar is commonly used for slow motion switch machine position indicators.

All LEDs only light when the power is flowing through them in one direction. Equally important is that all LEDs need a series current limiting resistor. Usually, you want to limit to a maximum of 20 milliamps (mA). Often 10 mA is fairly bright for modern LEDs. For the tiny ones used in signals and marker lamps, 3 mA is plenty.

If you want the equation to calculate the size resistor you need, see the sidebar on the next page.

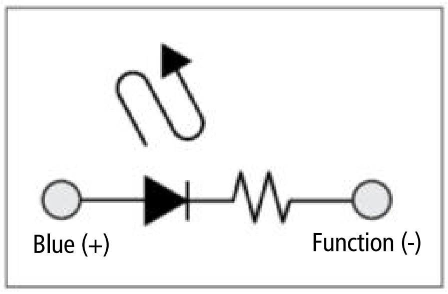
Trying different resistor values until you achieve the brightness you're after is probably the easier approach for most modelers. Start with 1,000 to 2,200 ohms and work up or down from there.

You can purchase resistors from All Electronics (allelectronics.com), Jameco Electronics (jameco.com), eBay, and other outlets. Jameco also sells assortment sets. Resistor selector boxes are available, but they're not inexpensive. Unless you always keep your brain engaged, you could accidentally select a value that's too low, thereby letting the smoke out of your DCC electronics. Once you figure what you want, you can buy resistors by the hundred for a few dollars. Just make sure you buy resistors with leads on them.

If you have never worked with LEDs before, here are a few tips. It used to be that LEDs could be wired backwards and they simply wouldn't work. Turn the LED around and you were good. But newer LEDs, particularly the white ones, can only tolerate a few volts when hooked up backwards before being damaged. Therefore, it's wise to make sure you wire them up correctly the first time.

Round LEDs with leads generally have two ways to determine which lead is which. One, there's a flat side to the rim of the LED. Two, one lead is shorter than the other. ② For the 3mm ones discussed here, look for the short lead. The short lead is the cathode, or negative, lead. In a schematic, it's the end with the line that the arrow is pointing to it ③.

The positive end, called the anode, goes to your positive power source. Usually, that will be the blue lead of a decoder. Unless you are using a decoder that has a built-in resistor (examples include the NCE Light-It and the NixTrainz Decoder Buddy motherboard for 21-pin decoders), you'll need to add a resistor. Consult your



③ The schematic symbol for an LED with a series, current-limiting resistor. Hook it up to a function lead as shown. The end with the arrow pointing to it is the cathode, or negative, lead.

Calculating the initial value of a current limiting resistor

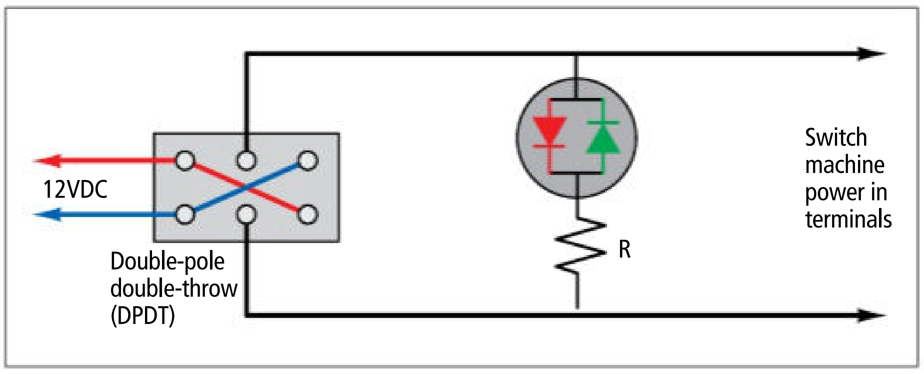
$$R = \frac{V_{PS} - V_L - V_D}{I_L}$$

$$W = I_L^2 \times R$$

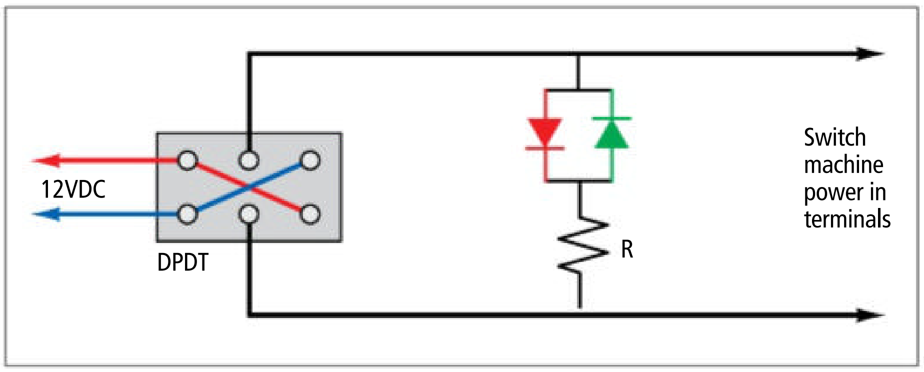
Where:

V_{PS} is voltage provided by power source.
V_L is the voltage rating of the LED.
V_D is the forward voltage drop of a diode, if used.
I_L is the nominal current in amps for the LED.
R is the value found for the resistor in ohms.
W is the wattage value found for the resistor.

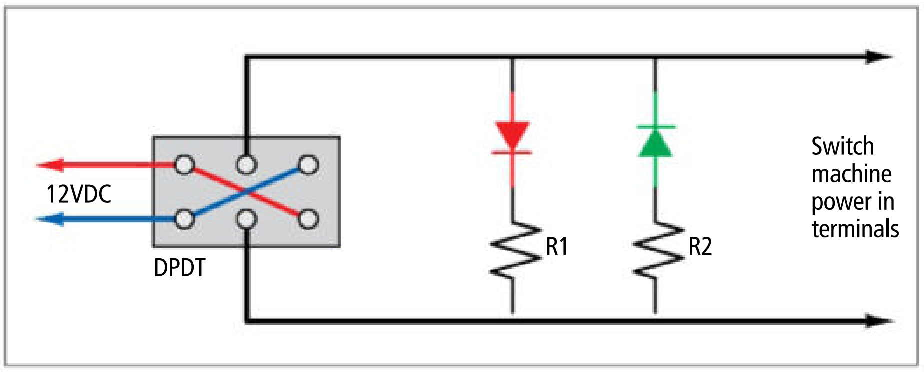
The term Vps is the output of your decoder, around 13V for HO, and not the track voltage. The term VD is 0.7V if you're using a series protection diode. Otherwise, it's 0V. The term IL is the nominal operating current in amps. If 20mA, then use 0.02. The term VL is the nominal operating voltage of the LED. The nominal operating voltage for my red and green LEDs is about 2V. The white LEDs are about 2.8V. – *Allan Gartner*


12VDC
Double-pole double-throw (DPDT)
R
Switch machine power in terminals

④ A single bipolar LED provides for the fewest number of parts and the least amount of wiring. If the green and red aren't the same brightness, there's nothing that can be done to change that.



⑤ A single resistor with an LED for each track is satisfactory for many layout applications.



⑥ This diagram will yield LEDs with balanced brightness. Allan suggests that you determine the resistor value for the green LED first. Then determine the resistor for the red LED that produces matching brightness. You'll likely find that the resistor for the red LED will be a higher value.

instruction manual to see if the resistor isn't needed. If you're not sure, try a resistor. If the LED light is very dim, then you will know that a resistor was already present.

The resistor can be attached to either of the LED's leads. I've shown it connected to the cathode end. Connect the other end of the resistor to the appropriate function lead, headlight (white wire), rear light (yellow wire) output, or one of the function outputs of your decoder.

The resistor should be between 470 and 3,300 ohms. The lower the value, the brighter the LED will be. Modern LEDs are efficient and bright. You'll probably find yourself using a resistor between 1,000 and 2,200 ohms. If you can manage working with tiny LEDs, you'll likely use a 2,200 ohm or higher resistor.

Electronics hobbyist suppliers like All Electronics and Jameco Electronics sell white LEDs, but there's no indication of what color temperature they are. I purchased all of Jameco's inexpensive white LEDs. None were warm white.

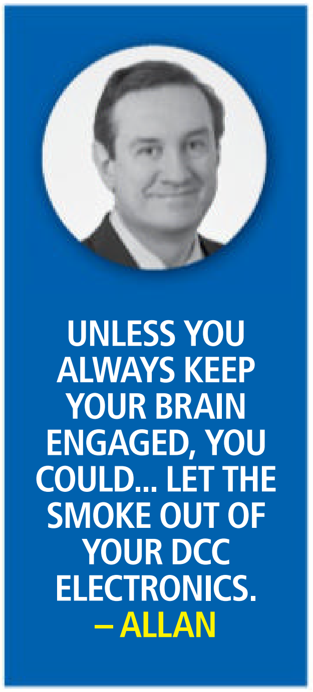
Hobby suppliers offer good prices, but I'm not confident that you'll get the same LED the next time you buy from them or even within the same order. I've seen that happen when buying from eBay. Big electronics distributors like Digi-Key (digikey.com) and Mouser (mouser.com) also carry a large selection of LEDs. You'll probably spend a lot of time determining which white LED will suit you at a price you are willing to pay.

All the LEDs that I compared for this column are 3mm (.118”) diameter. Smaller LEDs are made, but soldering wires to them can be difficult. If you want to get a hole the correct size for the 3mm LED, Micro Mark sells metric drill bits. Otherwise, 7⁄64” is just a little small and 1⁄8” is just a little big.

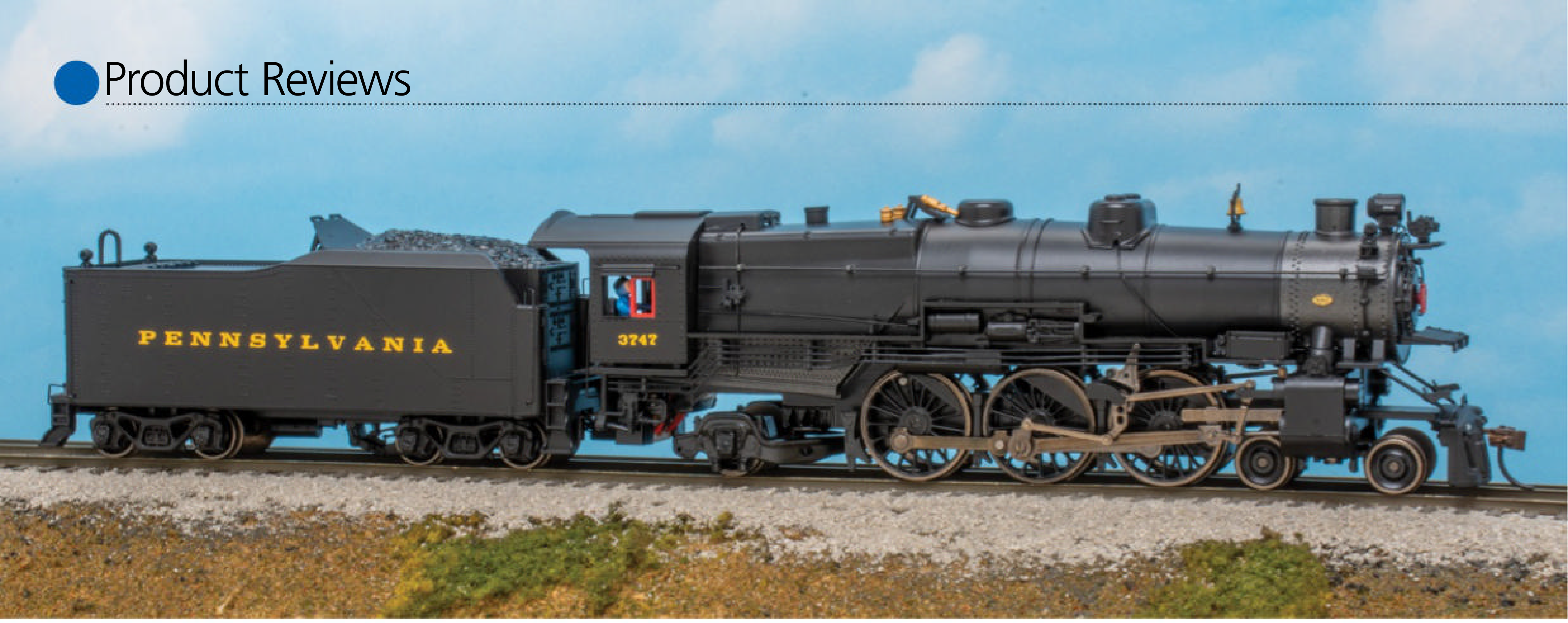
Many modelers like to have LEDs on their control panels to indicate turnout position. Control panels like this can take a fair amount of time to wire. Using one resistor saves a few cents, and more importantly, saves a few minutes per turnout control to wire. The more clutter you have in your control panel, the more crowded it becomes. Many modelers aren't overly concerned about the green LED being the same brightness as the red on their control panels. For completeness, I'm providing schematics for all options.

All the circuits shown can be used with the Walthers LCS, or any slow motion (stall motor) type switch machine like the Circuitron Tortoise.

For the fewest parts, you can use one bipolar LED ④. If you want an LED for each track leaving a turnout, look at ⑤. If you want balanced brightness, look at ⑥. MR



UNLESS YOU ALWAYS KEEP YOUR BRAIN ENGAGED, YOU COULD... LET THE SMOKE OUT OF YOUR DCC ELECTRONICS.
– ALLAN



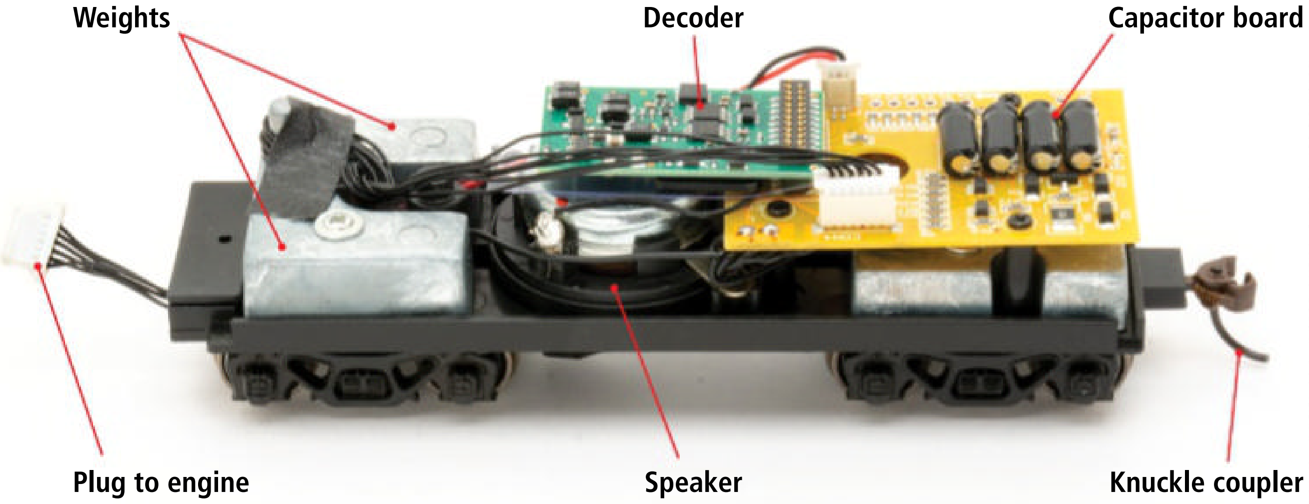
Bachmann Spectrum HO PRR K4 Pacific

An iconic Pennsylvania RR HO scale steam locomotive has been re-issued in Bachmann Industries' top-of-the-line Spectrum imprint. The PRR class K4 4-6-2 Pacific headed up the flagship passenger trains of the Standard Railway of the World for close to 40 years. Bachmann's model is a handsome, well designed, and smooth running rendition of this well known locomotive. The latest run of the model is equipped with a Train Control Systems WOWSound Digital Command Control (DCC) sound decoder and a Keep-Alive capacitor that lets it glide across unpowered turnout frogs and dirty track.

The Pennsylvania RR developed the class K4 4-6-2 Pacific in the mid-1910s based in part on the experimental class K29 4-6-2 built by Alco in 1911. It was one of a pair of steam locomotive designs, with the class L1 2-8-2 Mikado, intended to share the same boiler. The Pacific, with its larger diameter drivers, was faster than the Mikado and intended for passenger service. The demands of World War I put the railroad's focus on freight, requiring the construction of more Mikados, so the railroad didn't begin building Pacifics until 1917. Eventually the railroad owned 425 of the engines, 75 of which were built by Baldwin. The others came from the Pennsy's Altoona shops.

The boiler shared by the K4 and the L1 was larger than that on previous classes of steam locomotive. The distinctive square Belpaire firebox that was a hallmark of Pennsy steam power was bigger, too, increasing the fire grate area from 55 to 70 square feet. The firebox also included a "combustion chamber," a 36" extension to the firebox that boosted steaming capacity 20 percent. These improvements provided the engine with a hefty pulling power of 44,460 pound-feet, more than 40 percent better than the railroad's class E6 4-4-2 Atlantics.

The K4 Pacific was the Pennsylvania's primary passenger power until the arrival of diesels. As trains got longer and heavier in the 1930s, they were often double- or even triple-headed. The Pennsy began decomissioning the K4's in the late 1940s, and the last dropped fire in 1960. Two are preserved today.



The locomotive's electronics, including the WOWSound decoder, speaker, and Keep-Alive capacitor module, are in the tender.

The locomotive is painted a smooth, even satin black, with a dark graphite smokebox. The buff lettering on the cab and tender is straight, crisp, and opaque. The oval builder's plate on the side of the smokebox is legible under magnification.

I checked the model's dimensions against measurements on a drawing in *Model Railroader Cyclopedia: Vol. 1, Steam Locomotives* (Kalmbach, out of print). The placement of piping, valves, handgrabs, and other details also matched photos published in that book.

One exception is the driver diameter. Scale model wheels have deeper flanges than the prototype, so in order to maintain the proper driver spacing, the wheels must be proportionally smaller than on the prototype. The model has 75" drivers, as opposed to 80".

The model is loaded with authentic-looking details. Handgrabs, pipes, and uncoupling levers are formed wire. The valve gear and side rods are blackened metal. Other parts, like ladders, valves, whistle, and bell, are plastic. The trailing truck is die-cast metal, giving it more heft to stay on the track. The model is available with a prewar slat pilot or a postwar cast pilot. The headlight and smokebox front are also different in prewar and postwar versions.

The injection-molded plastic boiler sheathes the die-cast metal frame, in the middle of which nestles a flywheel-equipped, five-pole, skew-wound can

PERFORMANCE CHARTS

DRAWBAR PULL	2.56 ounces 36 freight cars on straight, level track

SCALE SPEED (DC)

VOLTS	SCALE MPH
10	3.7
11	3.7
12	12
13	26

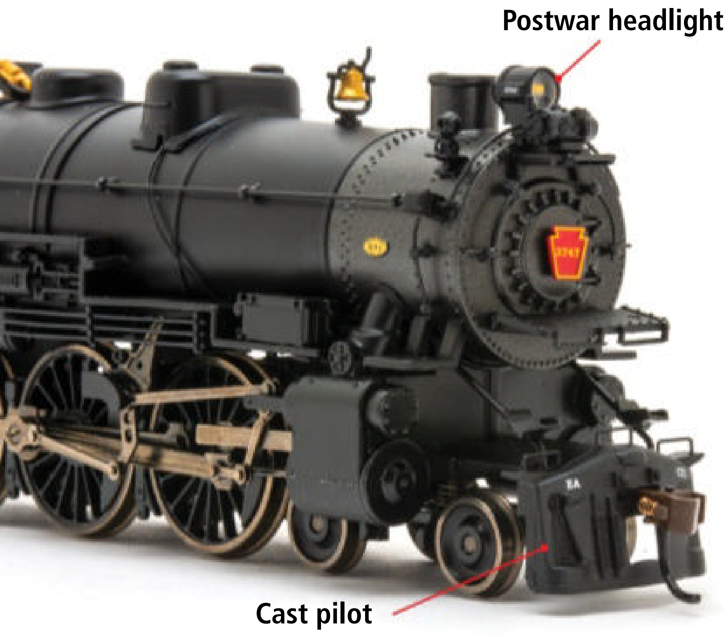
SCALE SPEED (DCC)

SPEED STEP	SCALE MPH
1	1.3
7	19
14	42
21	56
28	62

motor. The rear driver is driven by the motor; motion is transferred to the other two driver axles by the side rods. Wipers pick up power from the six driver wheels and eight tender wheels.

Two holes in the drawbar allow you to couple the tender a more realistic distance from the engine, but that will limit how tight of a radius the locomotive will be able to navigate. The manufacturer recommends a minimum radius of 22".

Time for a test run. Since the WOW Sound decoder is dual-mode, the locomotive will run under either direct current (DC) or Digital Command Control (DCC). I tested the locomotive first under direct current. I was a little apprehensive as I did so, because as I turned up the power pack, the motor buzzed and the headlight flickered on and off unsteadily. But eventually at 10V, the locomotive started moving at 3.7 scale mph. It picked up a little speed at 12V, then topped out at 26 smph at 13V, the maximum our DC power pack puts out. That's considerably less than the prototype's 90 mph top speed.



The locomotives are available with the original slat pilot and other prewar details, or the postwar cast pilot shown here on our test sample.

I liked that under DC, the decoder automatically played two toots of the whistle when starting in the forward direction and three when starting in reverse. At low speeds, the bell rings constantly. This sound grated on me after a while, so when I switched over to DCC, I used the WOWSound decoder's Audio-Assist to lower the bell's volume.

Audio-Assist uses voice prompts to guide the user through adjusting settings for sound effect volumes, bell and horn selection, lighting effects, and the like. I pressed function key 8 (F8) four times in quick succession to access Audio-Assist. Voice instructions played from the locomotive's speaker, guiding me to press F1 to access the sound menu, then navigate to the sound effect volume controls. Pressing F3 and F4 let me cycle through the available sound effects until I got to the bell, after which I adjusted the bell volume with F1 and F2. Pressing F0 exited Audio-Assist. I never had to look up a single Configuration Variable!

With that taken care of, I ran the engine through the DCC speed tests. The range of speeds available under DCC control was a lot wider and more realistic than it was under DC. The locomotive delivered a stately roll of just 1.3 scale mph at speed step 1, perfect for gently coupling onto a loaded passenger consist. At speed step 28, it topped out at 62 scale mph. That's still only about ⅔ of the prototype's top speed, but it's fine for a locomotive pulling a loaded train on a typical HO scale layout.

One press of the F8 key mutes and unmutes the sound, as is typical of most sound decoders. But two quick presses accesses the second and third pages of function key controls – easier than using the function-shift key on some DCC controllers. I used this to test out the braking keys, which are on page 2. I liked being able to push F5 to bring the train to a gentle, flange-squealing stop, then start it up again with a press of F4 to release the brakes. However, I wish the Audio-Assist wouldn't announce "Function page 2" and so on when I switched pages. I would like to be able to use both the brake function and the horn on function page 1 without that audible break in the realism. (If you have a 28-function DCC system, the brake is on F14 and F15.)

Facts & features

Price: $569

Manufacturer

Bachmann Industries
1400 E. Erie Ave.
Philadelphia, PA 19124
bachmanntrains.com

Era: 1917 (1920 for no. 3747) to end of steam era

Road names: Pennsylvania RR (prewar version with original slat pilot or postwar with modern pilot, two road numbers per body style).

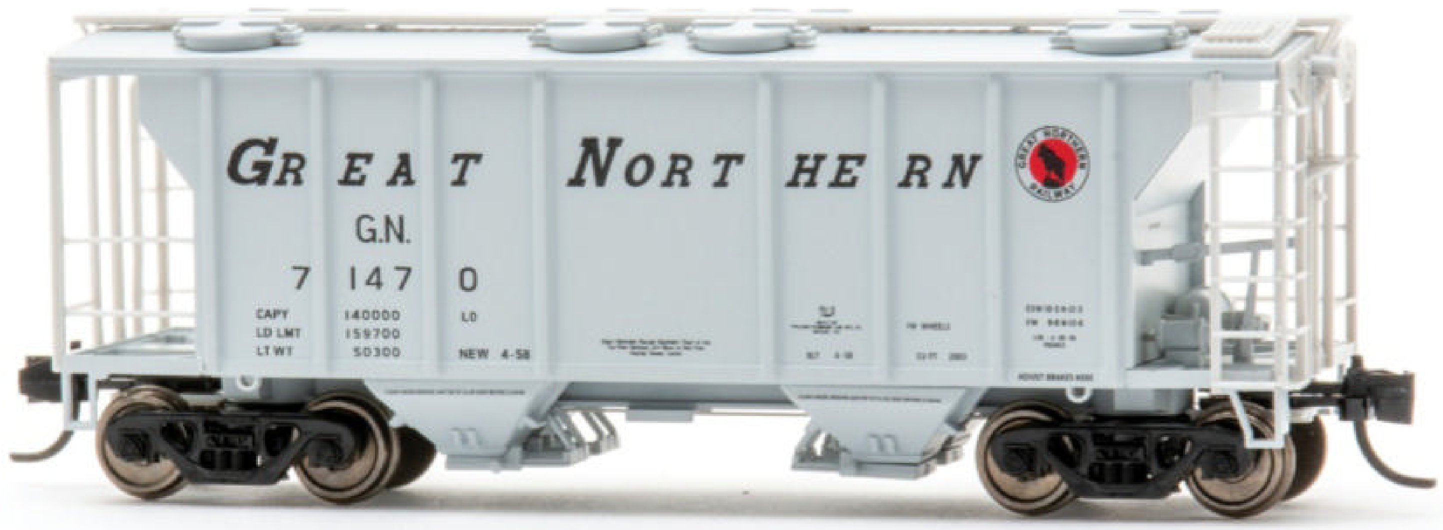
Features

- Blackened metal RP-25 wheels (electrical pickup on 6 drivers and 8 tender wheels)
- Blackened metal running gear
- Engineer and fireman figures in cab
- E-Z Mate Mark II knuckle couplers (rear coupler .040" too low)
- Keep-Alive capacitor
- Light-emitting-diode headlight
- Minimum radius: 22"
- Train Control Systems WOWSound DCC sound decoder with Audio-Assist
- Weight: 1 lb. 1.6 ounces (engine only, 13.2 ounces)
- Wire grab irons and uncoupling levers

Finally, I took the locomotive for a test run on our HO scale Milwaukee, Racine & Troy. It was satisfying to hear the steam engine laboring hard as it lugged a five-car train up the curving 3 percent grade out of Bay Junction, then fade away as it topped the grade at Skyridge and began to drift downhill.

A model of an icon. Due to its large numbers and its use on some of the most prominent passenger trains of the day, including the *Broadway Limited* and *Spirit of St. Louis*, the Pennsylvania RR class K4 4-6-2 Pacific is one of the most well known steam engines in history. If you model the PRR from World War I to the transition era, you should have K4s on the point of your passenger trains. Bachmann's HO scale model is a fine looking, well made, and accurately rendered model, and the Train Control Systems WOWSound decoder makes it a pleasure to run. – *Steven Otte, senior associate editor*

Micro-Trains N scale Pullman-Standard covered hopper



Micro-Trains Line Co. is no stranger to the N scale market, celebrating its 50th anniversary in 2022. One of the highlights of the milestone year was the release of its 154th N scale body style, the Pullman-Standard PS-2 2,003-cubic-foot capacity two-bay covered hopper. The injection-molded plastic freight car features 33" metal wheels; a see-through etched-metal brakewheel platform; and many separate, factory-applied parts.

Our sample is decorated as Great Northern No. 71470, part of the railroad's 71405 through 71504 series built by Pullman-Standard (PS) under lot 8406 in April 1958. The original capacity of the cars was 140,000 pounds. It was later increased to 154,000 pounds.

Great Northern used this series of covered hoppers in cement service. Other railroads and private owners transported powdered chemicals, fertilizers, and grains, among other items, in the 2,003-cubic-foot capacity cars.

Examples of PS-2 covered hoppers are still in use today, most in maintenance-of-way and company service. Some railroads removed the roof and replaced the outlet gates with doors so the cars could be used in ballast service. Other carriers use the hoppers to transport sand for diesel locomotives.

The Micro-Trains PS-2 covered hopper is a cleverly designed plastic model. The sides, roof, and vertical end panels are molded as a single piece. The see-through plastic running board, eight hatch covers, and slope sheet portion of the ends are separate, factory-installed, press-fit pieces. Open U-shaped roping staples are located on the sides above both trucks.

Engineering plastic was used for the end cages. The corner posts, ladder stiles, ladder rungs, end posts, and hand brake posts (B end only) are all finely rendered. The brakewheel platform is a separate, see-through etched-metal part. The brake wheel is a freestanding plastic casting. Five pins on the back of the end cages (three across the top, two on the bottom) fit into corresponding sockets on the carbody.

Where the car really shines is the design of the underbody. The end frames include molded stirrup steps and mounting pins for the body-mounted couplers. A plastic lid holds the couplers in place. The air reservoir, brake cylinder, control valve and related piping are freestanding parts on the B end.

Between the end frames is a rectangular piece measuring $1\frac{51}{64}$" x $\frac{7}{16}$". It consists of the center sills, triangle-shaped center sill filler pieces, and four mounting holes. The holes are for pins and sockets on the hopper bay halves to pass through. Metal weights are concealed inside the hopper bays. The outlet gates are press-fit pieces.

Modeler-installed trainline hoses and uncoupling levers are included in the jewel case. The parts fit into factory-molded holes on the car.

The covered hopper is neatly painted gray. Except for the red circle behind Rocky the Goat in the herald, all of the lettering is black. The lettering placement matches prototype photos I found of car No. 71470 in print and online references. A few small stencils were omitted.

The roller-bearing trucks on the Micro-Trains car are black. According to Reference Sheet No. 91 from the Great Northern Railway Historical Society (GNRHS), cars from the 71405 through 71504 series were delivered with Mineral Red trucks. Over time the trucks were coated with road grime and cement dust.

Prototype drawings of the Pullman-Standard PS-2 2,003-cubic-foot capacity covered hopper are plentiful. The model's dimensions closely follow drawings in the previously cited publication from the GNRHS.

The Pullman-Standard PS-2 2,003-cubic-foot capacity covered hopper is a well-executed model. Though Micro-Trains has been around for more than a half-century, the company continues to innovate and impress. Metal wheels, body-mounted couplers, and etched-metal parts show that the company is listening to customers and paying attention to its competition. I look forward to seeing what Micro-Trains Line Co. will be releasing in the coming years. – *Cody Grivno, senior editor*

Facts & features

Price: $45.95

Manufacturer
Micro-Trains Line Co.
351 Rogue River Pkwy.
Talent, OR 97540-1200
micro-trains.com

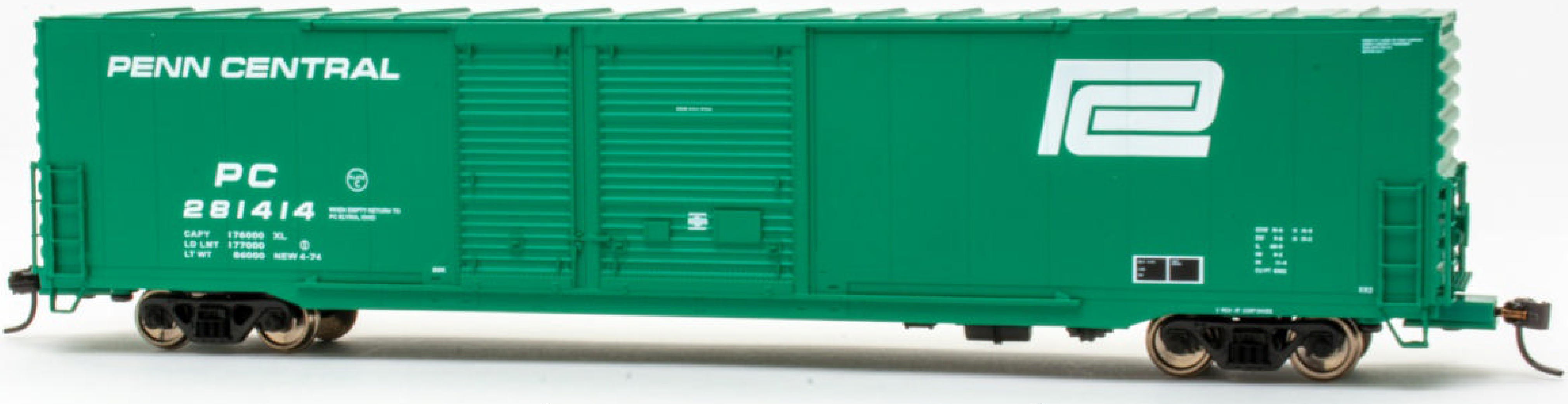
Era: April 1958 through 1980s (as decorated)

Road names: Great Northern and Western Pacific. Two road numbers per paint scheme.

Features

- Body-mounted Magne-Matic couplers, at correct height
- Injection-molded plastic construction
- Metal wheelsets, correctly gauged
- See-through plastic running boards with molded corner grab irons
- Weight: .7 ounce (.2 ounce too light per National Model Railroad Association Recommended Practice 20.1)

Pullman-Standard 60-foot auto parts boxcar from Walthers



Wm. K. Walthers Inc. recently released its Pullman-Standard 60-foot double-door auto parts boxcar with upgraded tooling. The WalthersMainline-series car features new car sides, a mix of molded and freestanding parts, and Proto-Max metal couplers.

As the U.S. Interstate Highway System was growing and automobile production was ramping up in the 1960s, vehicle manufacturers needed a reliable way to transport auto parts from the factories to the assembly plants. These large, heavy parts required new boxcars to be built, which led Pullman-Standard to produce its line of 60-foot auto parts boxcars.

The new boxcars were offered in various single- and double-door combinations specifically designed for transporting large parts, such as transmissions and engines. The wide door openings made it possible for forklifts to load and unload the cars, while the cushioned underframe protected the parts in transit. Pullman built its auto parts boxcars for a variety of railroads throughout the 1960s and '70s. Some may still be found on the rails today.

The latest release of the auto parts boxcar has 6- and 10-foot-wide side doors. Our sample is decorated as Penn Central No. 281414. Walthers offers the car in seven other road names with three road numbers each, as well as undecorated.

In addition to the updated sides, the injection-molded plastic body has factory-applied ladders on the sides and ends and molded stirrup steps. The non-positionable doors and their respective rails have finely molded detail. Both car ends are fitted with a see-through crossover platforms and a molded tack board. The B-end includes a freestanding brake wheel.

The center sill and crossmembers on the underbody are cast as a single piece. Separate, factory-applied piping, hangers, levers, rods, air reservoir, control valve, and brake cylinder round out the underbody details on this car.

To enable the 9½" long car to navigate 18" radius curves, the model is fitted with swinging draft-gear boxes. However, the car will look better on larger radius curves.

The model's dimensions closely follow data in the January 1975 edition of *The Official Railway Equipment Register* (ORER). The metal Proto-Max couplers are mounted at the correct height. The boxcar rides on 70-ton roller-bearing trucks with correctly gauged 33" RP-25 contour metal wheels on plastic axles.

The Deepwater Green paint is smooth and evenly applied, and the lettering is crisp. Even the small ownership stencil in the upper right corner is legible under magnification. Very impressive!

The details and lettering placement follow prototype pictures of other cars from the PC 281400-281635 series. The printed car data was consistent with information published in the ORER.

The Automatic Car Identification (ACI) placards were omitted from the model. This detail would be easy to add with one of the various ACI decals on the market.

The Pullman-Standard 60-foot double-door auto parts boxcar is a solid addition to the WalthersMainline series. The model has a good blend of freestanding and molded details, and it's offered in colorful paint schemes typical of the era. This boxcar would look right at home on any layout from the 1960s to today and is a must-have piece for anyone modeling the automobile industry. – *Bryson Sleppy, associate editor*

Facts & features

Price: $34.98; undecorated, $29.98

Manufacturer

Wm. K. Walthers Inc.
5601 W. Florist Ave.
Milwaukee, WI 53218
walthers.com

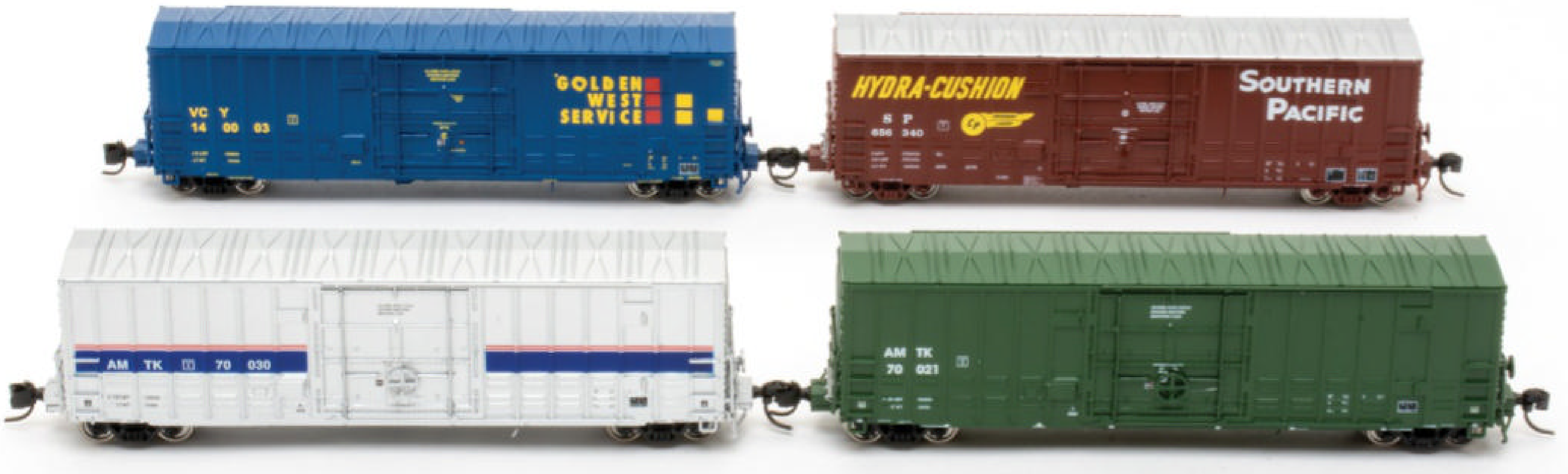
Era: 1960s to 2000s

Road names: Penn Central (Deepwater Green), Conrail (brown and white with "can opener" herald), CSX (brown with black doors), Erie Lackawanna (brown and white with diamond herald and "Cushioned Car" stencil), Norfolk & Western (black and white), Rock Island (brown with "Cushioned Underframe" lettering), St. Louis Southwestern (Cotton Belt, brown and white), and Union Pacific (yellow and silver with "Automated Railway" logo). Three road numbers per scheme; also available undecorated.

Features

- 33" RP-25 metal wheels, in gauge
- 70-ton trucks
- Based on cars with 6- and 10-foot doors
- Proto-Max metal couplers in a swinging draft-gear box, mounted at correct height
- Updated tooling with new car sides
- Weight: 6.3 ounces (.5 ounce too heavy based on National Model Railroad Association Recommended Practice 20.1)

Rapido N scale Pacific Car & Foundry boxcars



Pacific Car & Foundry class B-100-40 boxcars have joined the growing lineup of N scale freight cars from Rapido Trains. The plastic models feature a mix of separate, factory-applied and molded details, metal wheelsets, and body-mounted couplers.

One of the four sample cars we received is decorated as Southern Pacific No. 656340, part of the railroad's 656200 through 656449 series built by Pacific Car & Foundry in November and December 1976. The prototype cars featured a nailable steel floor, 12-foot-wide door openings, Car Pac loaders, half-height "waffle" sides, and a Hydra-Cushion underframe.

Some cars from the B-100-40 class were spun off to secondary owners. Amtrak acquired a group of 50 B-100-40 and B-100-43 boxcars in 1997 for use in express service. Since the cars were going to be used in high-speed passenger service, they were fitted with new swing-motion trucks and struts, the latter to improve stability.

Other upgrades included door wheels and end-of-train device brackets. Lacking head-end power connections, the cars could only be hauled at the end of trains. The boxcars were removed from the Amtrak fleet in the early 2000s when the passenger carrier discontinued carload express service.

Though more than 45 years old, B-100-40 boxcars are still earning their keep. Examples can be found on Espee successor Union Pacific and shortline Columbus & Greenville.

The Rapido Trains SP B-100-40 boxcars have a one-piece injection-molded plastic body with a separate, factory-applied door latch mechanism, uncoupling levers, and end ladders; see-through etched-metal crossover platforms; and molded stirrup steps and side grab irons. The Amtrak models have freestanding door wheel.

The underbody has a molded draft-gear box, nailable steel floor detail, and laterals. The Hydra-Cushion underframe is a separate piece consisting of the center sills, body bolsters, bolster blocks, and crossmembers. The brake details are freestanding parts. A steel weight is secured to the top of the underbody with a pair of screws.

The uncoupling levers run from the corner of the carbody to the bottom of the screw-mounted draft-gear box cover. The lever isn't glued to the cover, making it easy to repair the couplers should the need arise.

The N scale boxcar is neatly painted in SP's as-delivered scheme. The white and yellow lettering is opaque and sharp, with few voids over the exterior posts. The lettering placement matches prototype photos I found in books and online. All but the tiniest lettering on the Pacific Car & Foundry builder's stencil is legible under magnification.

The boxcar's dimensions closely follow data published in the July 1994 edition of *The Official Railway Equipment Register* (R.E.R. Publishing Corp.) The 36" metal wheelsets are correctly gauged, and the body-mounted plastic couplers are at the correct height. The model weighs 1.4 ounces, .3 ounce too heavy per National Model Railroad Association Recommended Practice 20.1.

Though a mere 250 PC&F B-100-40 boxcars were built, all for Southern Pacific, the cars traveled throughout the country. Thanks to a carefully curated list of road names and paint schemes, the Rapido Trains model is relevant for modelers of the late 1970s to the present day. – *Cody Grivno, senior editor*

Facts & features

Price: Single car, $36.95; three-pack, $110.85; six-pack, $221.70

Manufacturer

Rapido Trains
500 Alden Road, Unit 21
Markham, ON, Canada L3R 5H5
rapidotrains.com

Era: 1976 to present (varies depending on paint scheme)

Road names: Southern Pacific (as delivered and Golden West Service patchout), Amtrak (green and phase 6), Columbus & Greenville (SP patchout), Golden West Service (dark blue), and Union Pacific (mineral red with shield herald and SP reporting marks). Multiple road numbers per scheme; also available undecorated.

Features

- 36" metal wheelsets, in gauge
- Body-mounted plastic couplers, at correct height
- Hydra-Cushion underframe
- Separate, factory-applied door wheels (Amtrak only), door-latch mechanism, end ladders, and uncoupling levers
- Road-number-specific paint patches as appropriate
- Underbody brake rigging
- Weight: 1.4 ounces (.3 ounce too heavy per National Model Railroad Association Recommended Practice 20.1)

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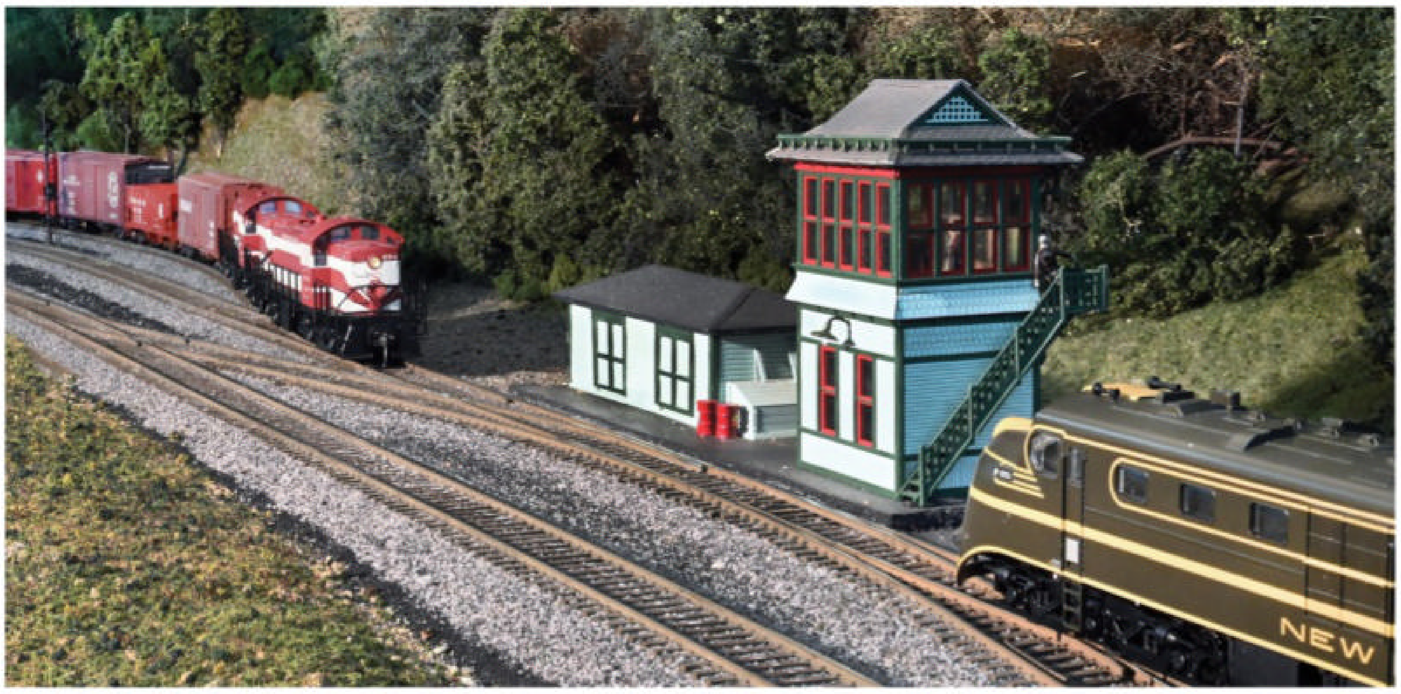
By Jerry Dziedzic

Radio dos and don'ts

Railroad safety has depended on reliable radio communication since radio started replacing telegraph and telephones after World War II. Radio enabled the change from timetable and train order (TTTO) to modern systems transmitting track warrants (TWC), Form D's, and other vital information. Proper procedures deserve a part in every operating session involving radio.

Rules require testing radios before a crew begins work. "Conductor, NE-84, radio check, over." The engineer's "NE-84, loud and clear, over" earns the reply "Loud and clear, conductor out" and an "Engineer, out" signoff.

Beginning by clearly identifying themselves enables these employees to confirm their radios are working. "Over" indicates an answer is expected; "out" indicates the end of transmission.



A Susquehanna freight ran the stop displayed by the interlocking home signal seen at far left, fouling the main track in front of the New Haven DL-109 without warning. Dave Abeles photo

Failure to use proper identification was a primary factor in a 2005 CSX wreck on its Portsmouth Subdivision near Franklin, Va. This was single-track, Direct Traffic Control territory, where a dispatcher (DS) authorizes train movements from block to block, unlike TTTO and TWC point-to-point methods.

Listening to the radio recording during a rules class made my heart skip. DS called K960, a southbound train. Fatefully, K959, a northbound, answered "K960, over." DS began issuing authority: "K960 engine number 471 absolute north and south Boykins and Branchville blocks two blocks over." The crew gave its own engine number and reversed the blocks in its repeat: "9011 absolute both directions Branchville and Boykins two blocks over."

Here's the crucial failure: the crew repeated Boykins and Branchville when DS corrected it on the block sequence, but neither DS nor the crew reconciled these apparent block and engine number contradictions. K959 started rolling north on authority intended for K960.

Fate offered a second chance about 45 minutes later when southbound K960 itself asked for the Boykins and Branchville blocks. DS noted the earlier time in his records and replied: "I remember giving them to you but will do it again." The overlapping authority this produced resulted in the two trains colliding head-on. Fortunately, no employees died.

Such was not the case in a 1969 collision in which radio procedure and other violations cost three Illinois Central workers their lives. A junction near Indian Oaks, Ill., operated by Centralized Traffic Control reduced three main tracks to two.

A northbound freight passed a yellow-over-red signal on No. 3 track that demanded reducing speed to prepare to stop at the home signal, which guarded the switch with No. 2 track. Instead, its engineer radioed a nearby operator. He misinterpreted the reply, expecting the switch to be lined for his train. Last-ditch emergency braking when the stop signal at the interlocking came into view didn't prevent the train from fouling the switch in front of No. 25, a southbound passenger train approaching at high speed.

The accident investigation found several factors contributed to the collision. One was a local practice, explicitly prohibited by IC rules, by which crews inquired about the condition of signals by radio. Had the engineer observed the rule demanding a speed reduction instead of relying on radio information, he may not have overrun the home signal.

The photo above, posed where three tracks go to two on my layout, illustrates the situation at Indian Oaks. The freight in the left background ran through the interlocking's home signal before stopping, fouling a main track. The *Federal Express*, headed by a New Haven DL-109, is braking hard, but a collision seems inevitable.

Extending heavenly hands prevents collisions like these on a layout, and an investigator may be no more menacing than the host. However, there's room to tighten up operating procedures. Programming decoders with momentum and braking mimics prototype train handling, demanding careful attention to stopping.

A radio check seems trite when using FRS radios unless one considers how often users have to ask one another if they're being heard. Acknowledging voice instructions by repeating them is good practice. Taking such lessons from the prototype helps deliver a highly realistic operating session experience. MR

PROPER PROCEDURES DESERVE A PART IN EVERY OPERATING SESSION INVOLVING RADIO. – JERRY

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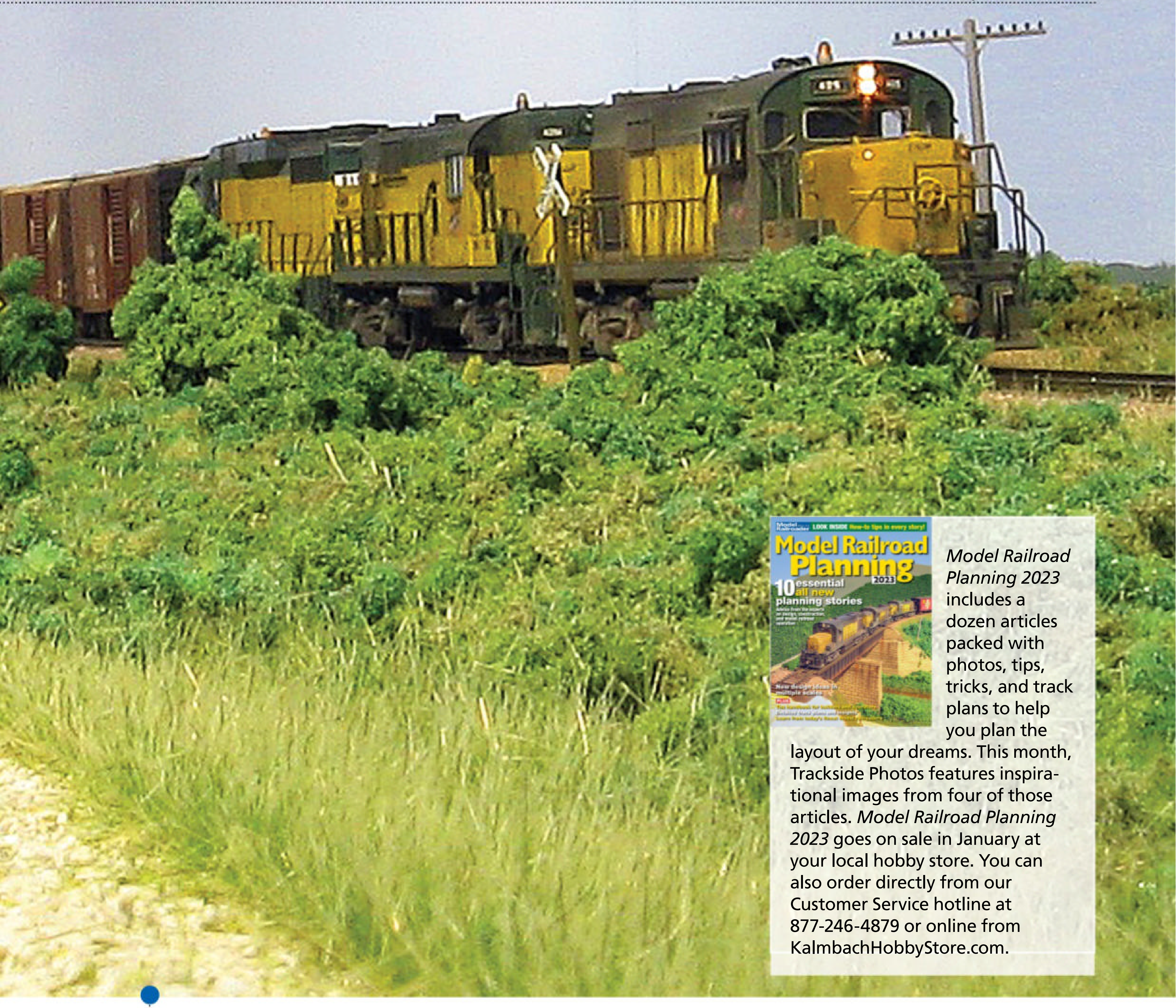
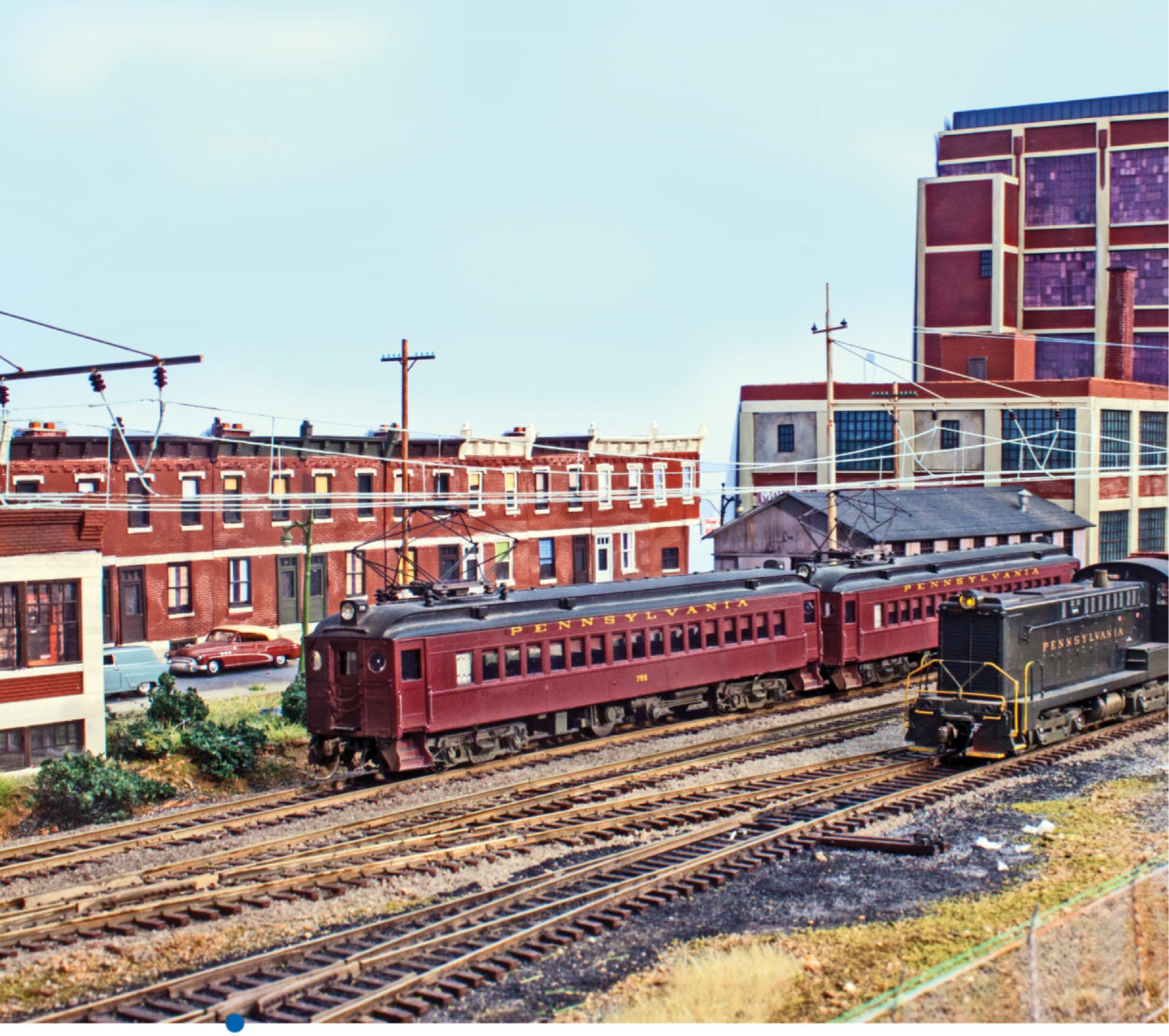


Model Railroad Planning 2023 includes a dozen articles packed with photos, tips, tricks, and track plans to help you plan the layout of your dreams. This month, Trackside Photos features inspirational images from four of those articles. *Model Railroad Planning 2023* goes on sale in January at your local hobby store. You can also order directly from our Customer Service hotline at 877-246-4879 or online from KalmbachHobbyStore.com.

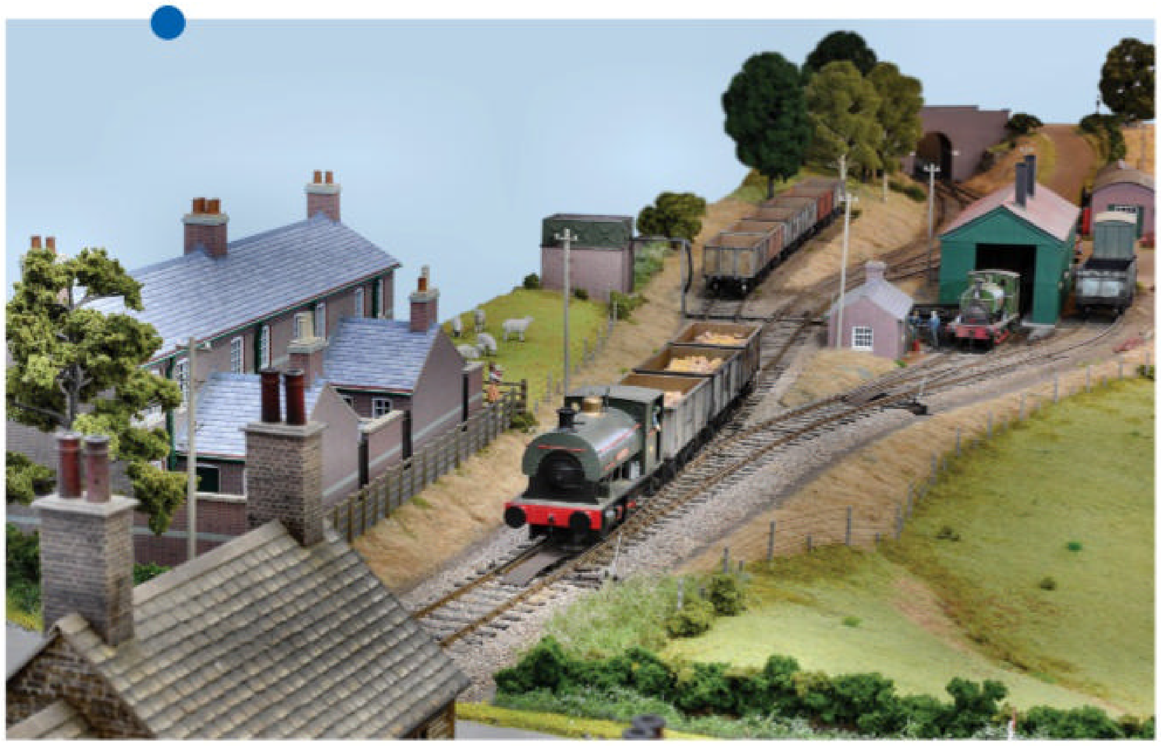
An Alco RS36 leads Train 482 through the sag west of Lewiston that parallels U.S. 14 on Dennis Eggert's HO model of the Chicago & North Western's "Alco Line East." The track was built with the sag to simulate the undulating grades of the prototype. Dennis Eggert photo

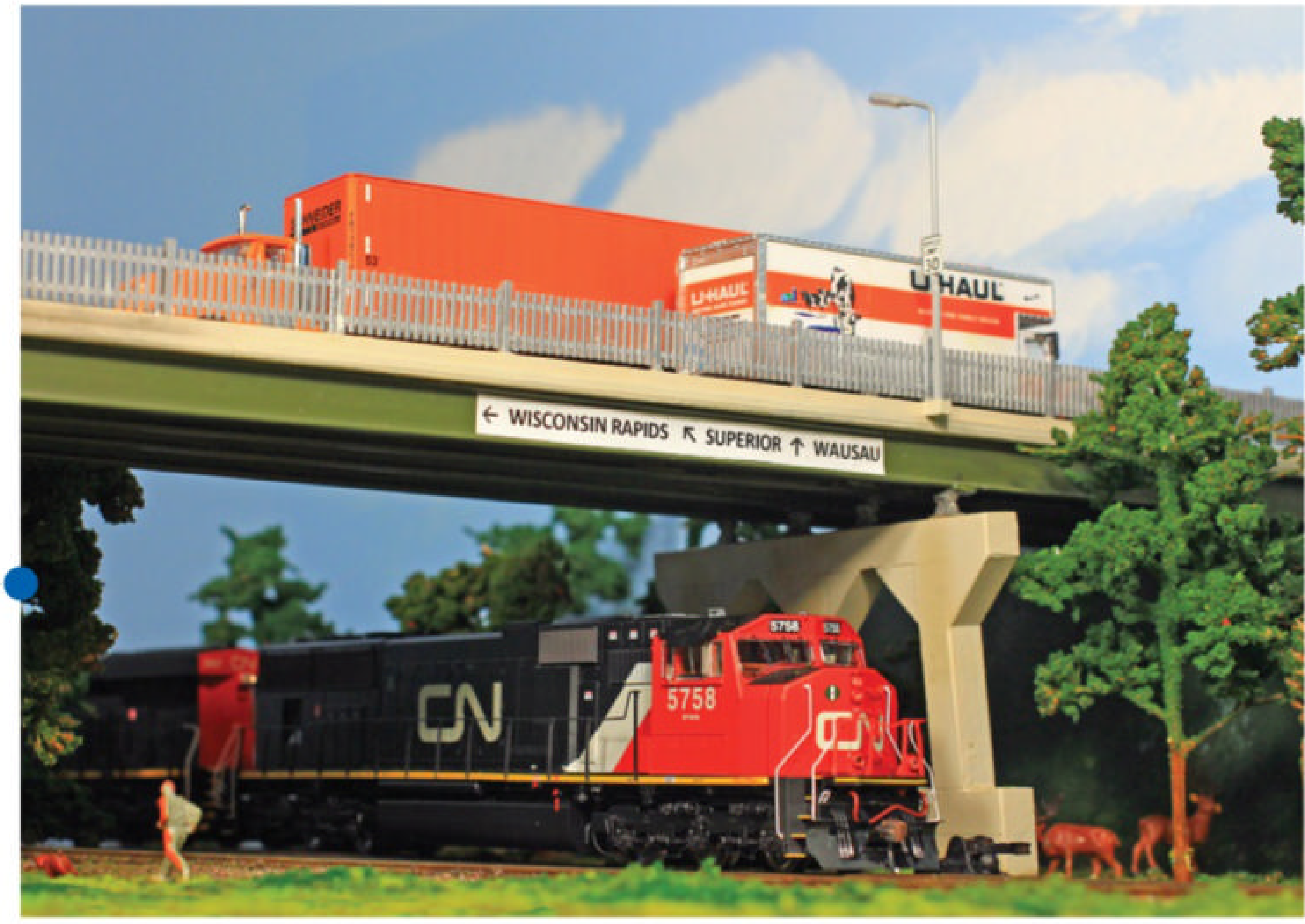


A runner from Margie Yard is about to enter Midvale Yard, while two MP54s pass along the outbound tracks of the Chestnut Hill Branch heading toward Chestnut Hill on Ron Hoess's HO scale model railroad. The telescoping tubular catenary poles reflect the early style of Pennsylvania RR electrification prior to the more common 1930s K-bridge style.
Paul J. Dolkos photo

PENNSYLVANIA

The Peckett 0-4-0ST *Cockspur* brings the first loads of the day up the 1-in-40 gradient to the exchange sidings. The track to the engine shed drops away at a steeper 1-in-18 (5.5%) gradient. The scene is on Ian Wilson's British-outline O scale layout. Tony Wright photo

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Canadian National SD75i No. 5758 brings Train 588 from Wausau, Wis., to Stevens Point, Wis., on Alan Saatkamp's HO scale railroad. The highway overpass creates a view block for two hidden tracks that provide staging for destinations located beyond the modeled layout. Matt Saatkamp photo

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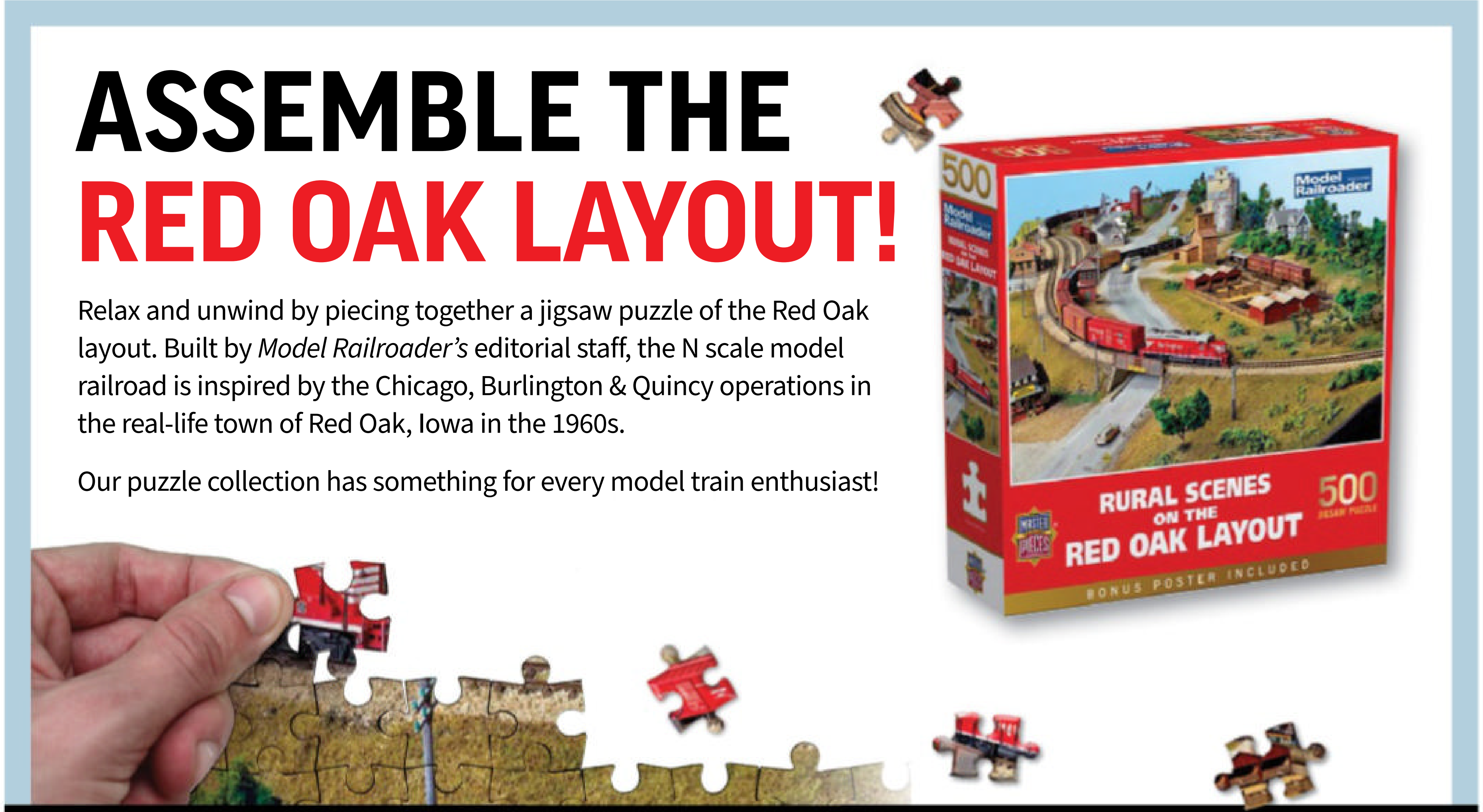

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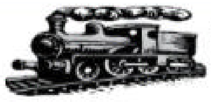

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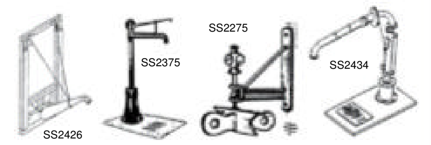

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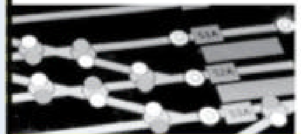

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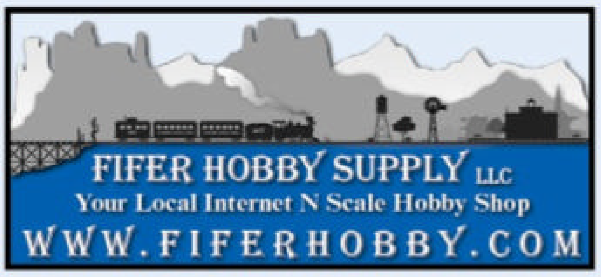
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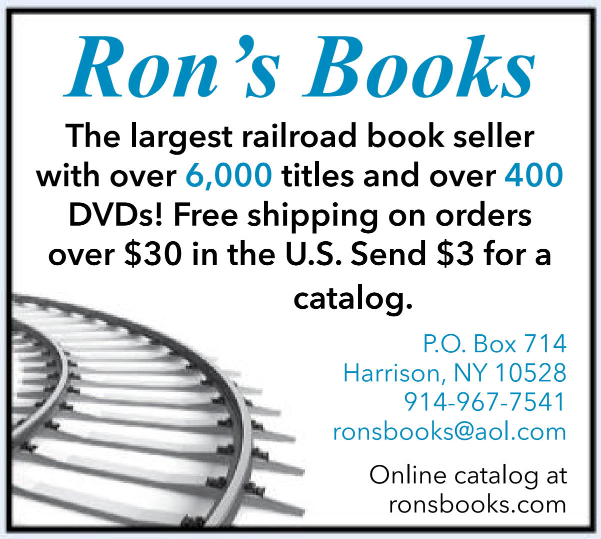
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Send your submissions to: *Model Railroader* — Classifieds, P.O. Box 1612 Waukesha, WI 53187-1612. Toll-free (888) 558-1544 Ext. 551 Fax: 1-262-796-0126. E-mail: classads@kalmbach.com

All ads must be prepaid and pertain to the subject of model railroading.

Schedule of Events

FL, BROOKSVILLE: Regal Railways presents Toy Trains & Hobby Show. Hernando Fairgrounds, 6436 Broad St., Brooksville, FL 34601. Saturday, January 21, 2023. 9:00am-2:00pm. Admission: $5.00 adults, children under 12 free. Vendors and operating layouts. Contact: Joe at 727-244-1341 or visit: www.regalrailways.com for more information.

FL, COCOA BEACH: Prototype Rails 2023. Cocoa Beach Hilton Oceanfront, 1550 N. Atlantic Avenue (Hwy A1A). January 5-7, 2023. Thursday, 7-10pm; Friday and Saturday, 9am-10pm. Prototype Modeling Meet: clinics, modular layouts, models on display, vendors. Registration $45 before 12/31/2022, $50 at the door. Contact Marty Megregian at indianfourdoc@aol.com or visit: www.prototyperails.com

IA, MONTICELLO: 2023 Train Show. 2 Days, February 4-5, 2023. Saturday 10am-5pm and Sunday 9am-1pm. Berndes Center, Jones County Fairgrounds, 766 N. Maple St., Monticello, IA 52310. Tables $30. Admission: $5, children under 12 free with paid adult. Monticello RR Club, PO Box 169, Monticello IA 52310 or email Ron Ackermann at rack611@gmail.com

IN, LEBANON: Central Indiana Division/NMRA Train Show. Boone County 4H Fairgrounds, 1300 E 100 S, Lebanon, IN 46052. Sunday, January 29, 2023, 10:00am-3:00pm. Admission $3.00 or $5.00 family. Dealers, Portable Train Layouts, Clinics, Door prizes. Dealer tables $16.00. Contact, Jim Shellhaas at 317-750-4834 or jshellha@butler.edu

MN, WOODBURY: Newport Model RR Club Train Flea Market. Woodbury High School, 2665 Woodlane Drive, Woodbury, MN 55125. Saturday, January 14, 2023, 9:00am-2:00pm. Admission $5.00. Club Address: Newport Train Club, PO Box 0061, St. Paul Park, MN 55071. Contact: Don, 763-257-5443

NC, ASHEVILLE: Asheville Train Show. Western North Carolina Agricultural Center. February 24-25, 2023. Friday noon-7:00pm and Saturday 9:00am-5:00pm. Admission $6.00, under 10 free. All scales, all gauges, collectibles, artifacts, operating layouts, hundreds of vendor tables. More: www.Asheville-Trainshow.com

NJ, BRICK: ECTP and Collectibles LLC presents The Brick Train Show. Elks Lodge, 2491 Hooper Avenue, Brick, NJ 08723. Sunday, January 8, 2023, 9:00am-2:00pm. Admission: $7.00; under 12 free with adult. John LaLima 732-845-5966. Go to www.eastcoasttrainparts.com and click on The Brick Show.

SC, CHARLESTON: Charleston Area Model Railroad Show. January 7-8, 2023. Saturday 10am-4pm and Sunday noon-4pm. Citadel Mall, 2070 Sam Rittenberg Blvd., Charleston, SC 29407. Three large operating layouts (N, HO, & O), vendors, food court, parking. Admission: $10. Active-duty military, first responders, and kids under 13 get in free. www.camrc.club

SC, EASLEY: CRMHA MODEL TRAIN EXPO 2023. February 17-18, 2023. Friday, noon-6pm. Saturday, 9am-3pm. Impact Center at Rock Springs Church, 207 Rock Springs Road, Easley, SC 29642. Admission: $8.00 Adults, good for both days. Children under 10 are FREE. Trains of all sizes, operating layouts, model train vendors, a Kid Zone, and more! Visit: www.crmha.org

TX, HOUSTON: Greater Houston Train Show presented by the San Jacinto Model Railroad Club. Saturday, February 18, 2023, 10:00am-4:30pm. Pasadena Convention Center, 7902 Fairmont Parkway, Pasadena, TX 77504. Operating Layouts, Classes on Railroads and Modeling Subjects, NMRA Contests, and Vendors from across the Southwest. Admission: $5 adults, under 12 FREE, $10 Family. Concessions, free parking. Info: http://sanjacmodeltrains.org/

TX, PLANO: Dallas Area Winter Train Show. Plano Event Center, 2000 E. Spring Creek Parkway. January 21-22, 2023, Saturday 10am-5pm; Sunday 10am-4pm. Adults $10.00, 12 and under free w/adult. 80,000 sq.ft. of model railroading with numerous operating layouts, layout tours, vendors, and door prizes. Information: Chris Atkins, chris@railroadmodelers.com 469-438-0741. Visit: www.dfwtrainsshow.com

WI, LA CROSSE: The 31st Annual Great Tri-State Rail Sale. La Crosse Center, 2nd & Pearl Streets. Saturday, January 28, 2023. 9:00am-3:00pm. Admission $5.00, under 12 free. 300 vendor tables. All Scales; Model, Toy & Antique Trains & Memorabilia. Information: 4000 Foundation, PO Box 3411, La Crosse, WI 54602, 608-781-9383. Visit: www.4000foundation.com

WI, STEVENS POINT: CWMR 25th Annual Model Railroad Show. Holiday Inn Convention Center Hotel. 1001 Amber Avenue. January 21-22, 2023. Saturday 9:00am-5:00pm. Sunday 10:00am-3:00pm. Adults $4.00, kids 12-17 $2.00. Many layouts, swap/sales tables, vendors. Contact Jim Miller, 715-340-0265; email: jimbro67@gmail.com

All listed events were confirmed as active at the time of press. Please contact event sponsor for current status of the event.

Classifieds

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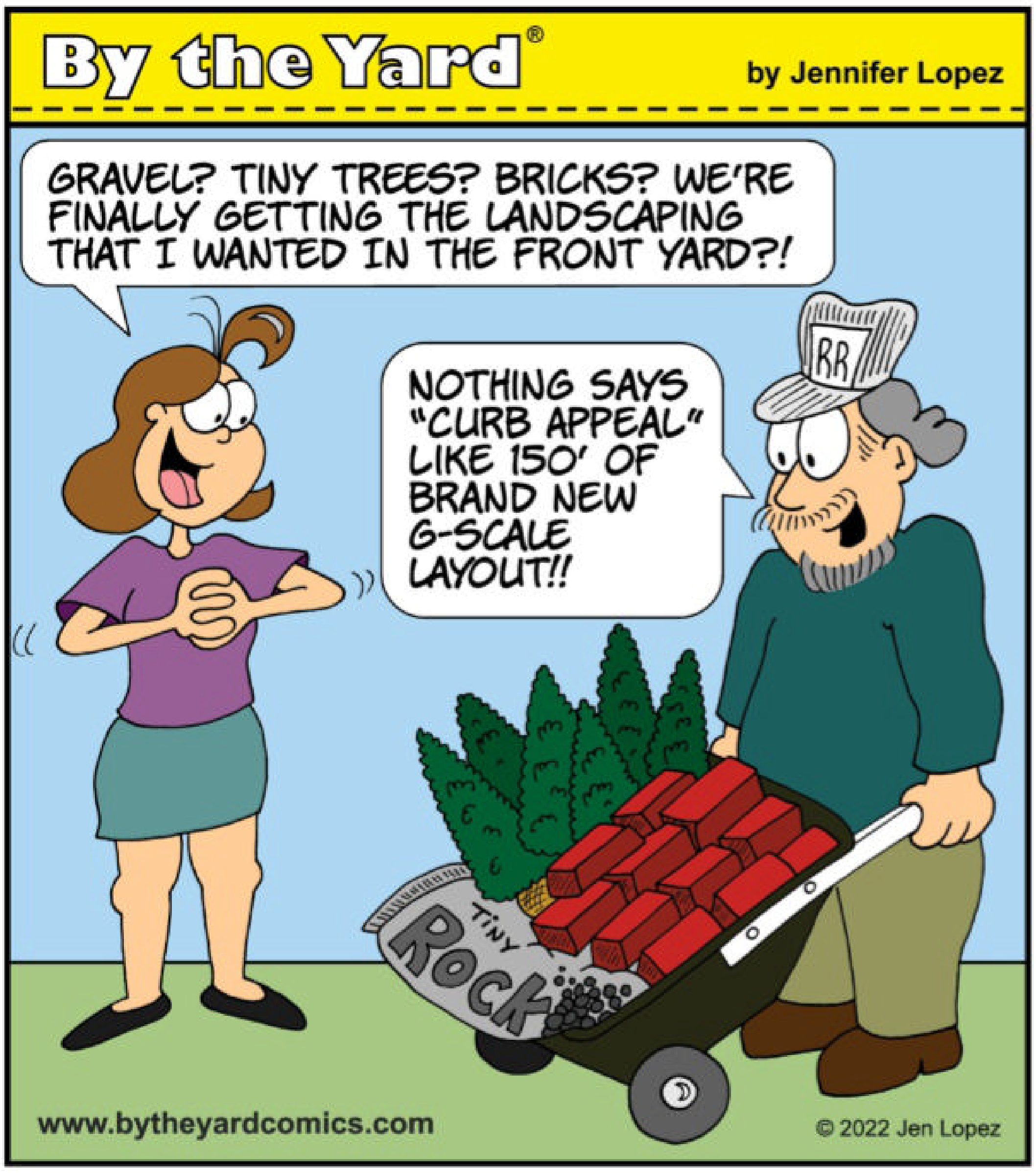
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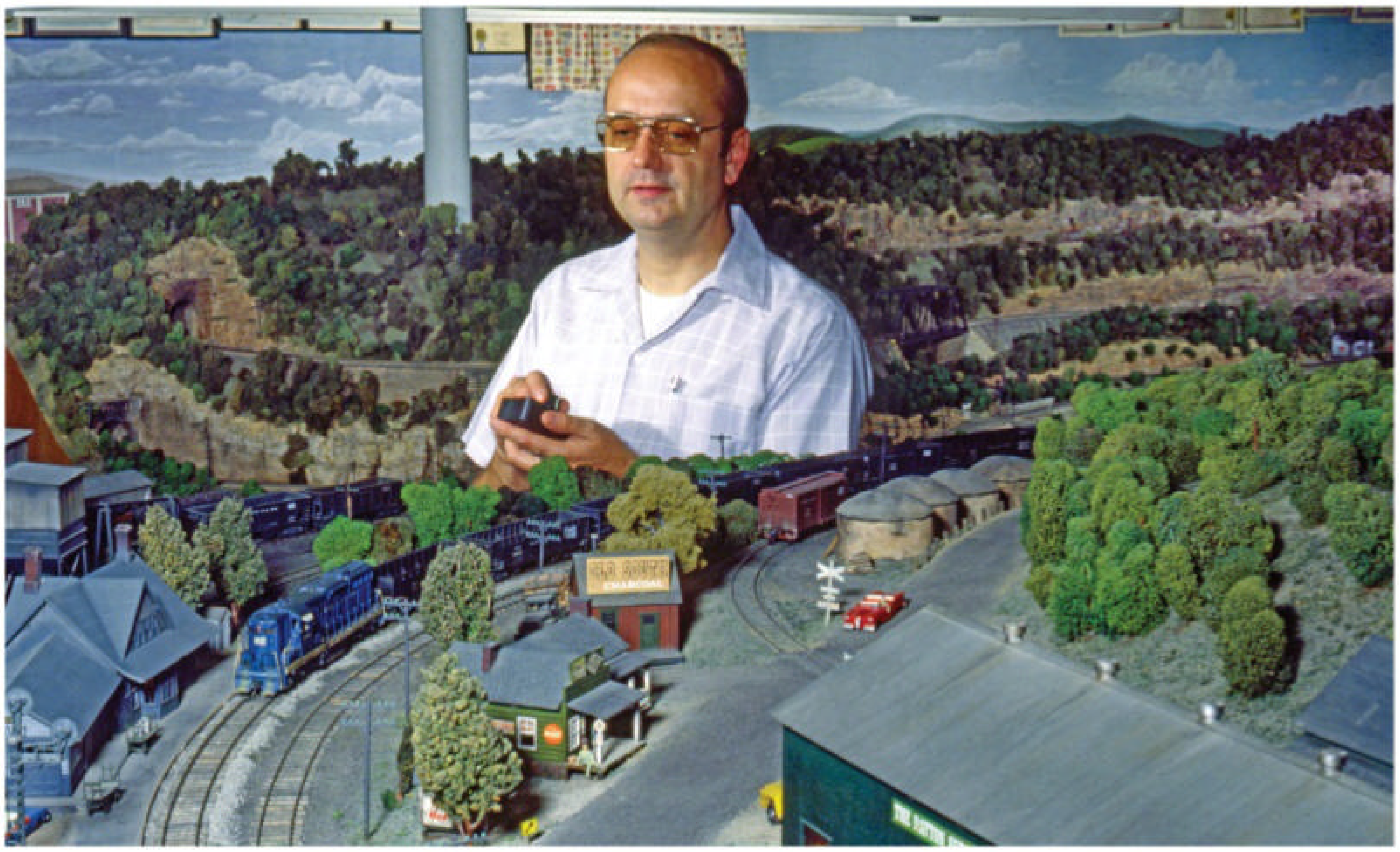
By Tony Koester

Two guys walk into a bar...



Among the important advancements Allen contributed to the hobby was the first walkaround command-control throttle, which allowed us to stay alongside our trains to observe signals, uncouple cars, and so on. Allen McClelland photo

The title sounds like the opening line of an old joke, but it was actually the beginning of a lifelong friendship and the advent of some remarkable journalism in the model railroad press. The time was the fall of 1970, the location Pittsburgh, Pa., and the occasion a National Model Railroad Association regional convention.

I had joined the staff of *Railroad Model Craftsman* a year and a half earlier and by that time was essentially in charge of all aspects of its production from planning and editing to graphic design. I had identified its weaknesses and made a list of its strong points, especially key contributors such as Dave Frary, Bob Hayden, John Allen, and Allen McClelland.

RMC had a policy of not asking *Model Railroader* contributors to write for us unless they approached us first, so I had to go with what I had, but there was enough talent already on hand to get things moving.

A key to improving RMC's content mix was to ensure the feature material was leading-edge – that is, it reflected what active modelers needed to know to build model railroads like those we saw featured in the magazines. And I couldn't think of a more representative model railroad than Allen McClelland's Virginian & Ohio. He was using rather plain-Jane, inexpensive models in a way that achieved a surprising amount of realism, and in his published articles, he described his railroad as though it actually existed and played a role in the nation's economy.

So when I noticed he was going to give a talk at the Pittsburgh regional, I signed up. As soon as I arrived, I sought him out, and for some reason we "clicked" and became instant friends. We quickly discovered that we had a lot to talk about, much more than a simple editor-author relationship would suggest, so we looked for a quiet place to chat.

Finding none at the convention hotel, we headed down the street and found a bar. Neither of us are drinkers to any extent; this was probably the first time I had walked into a bar, in fact. But it was the perfect venue to get away from the distractions of the convention and to get to know each other. At that time and place, a friendship began.

To feature the V&O in RMC, I painted a brass model of a Nickel Plate Berkshire and shipped it to Allen so he could replicate the fantrips of prototype NKP 2-8-4 No. 759 that were occurring at the time. That led to a phone call: "Allen, I'd like to cover a model railroad from A to Z beginning with its planning and ending with how it's operated, and I think the V&O is the perfect candidate." (Or words to that effect.)

As happened so many more times over the years, Allen replied that he had been thinking about a similar series of articles, and "The V&O Story" series that appeared in the mid-1970s was born. Allen couldn't type, so Doug Gurin and I wrote every fact we knew about the V&O on 3 x 5 cards. When we didn't know something, we wrote down a question instead. I then sorted the cards into tall stacks by category and called Allen to interview him, thus ensuring what we presented to readers was in his own words.

AS SOON AS I ARRIVED, I SOUGHT ALLEN OUT, AND FOR SOME REASON WE "CLICKED" AND BECAME INSTANT FRIENDS.
– TONY

Some of the hobby's most respected practitioners tell me their copies of the subsequent soft-cover *The V&O Story* book are about worn out. They attest to the influence that Allen and his V&O had on them and the hobby as a whole, leading us to look at our model railroads not as models but as miniature stand-ins for their prototypes with a purpose for every car and train movement. They learned that consistency across the board was more important than excellence in only one area of expertise, and that consistency was attainable if you paid attention to details – not just scenery and hardware but how trains moved and why.

With Allen's passing on Oct. 28, 2022, the last line of a key chapter in the development of scale model railroading has been written. May he rest in peace. MR

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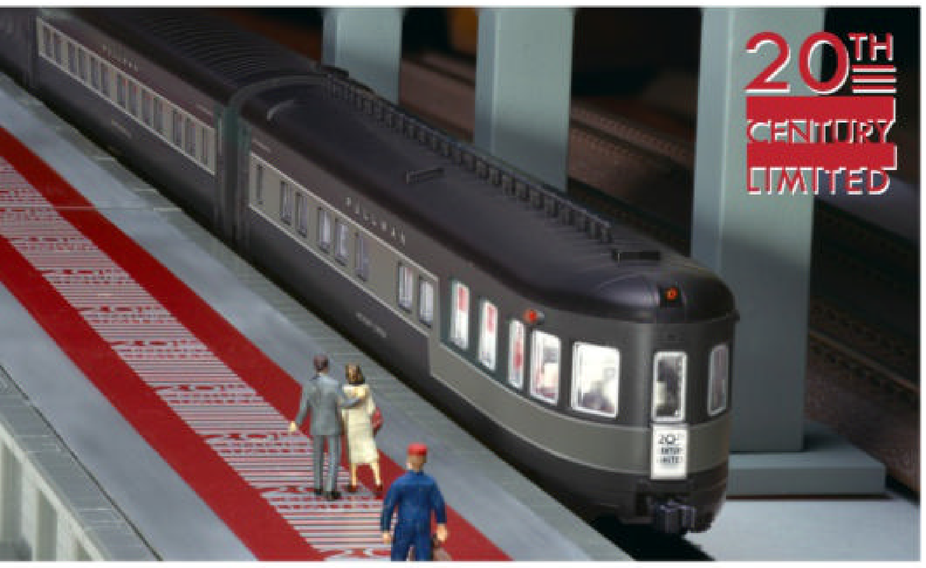

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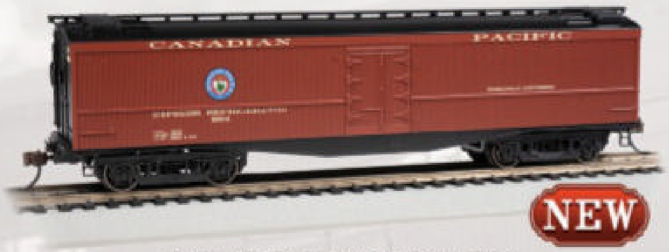
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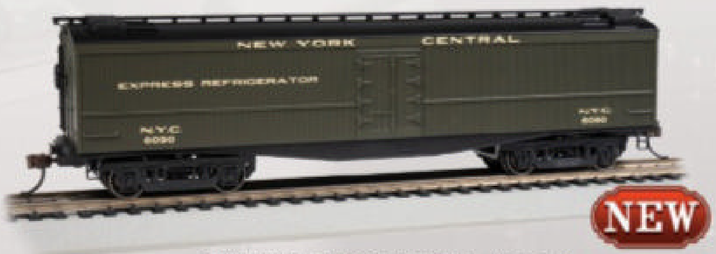
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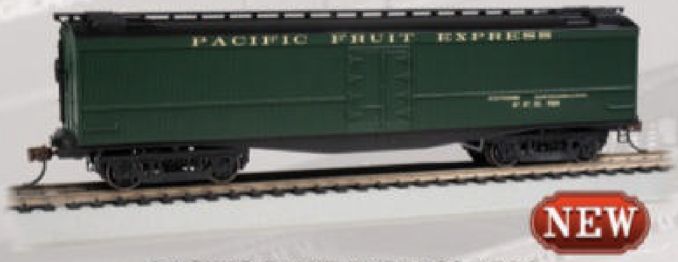
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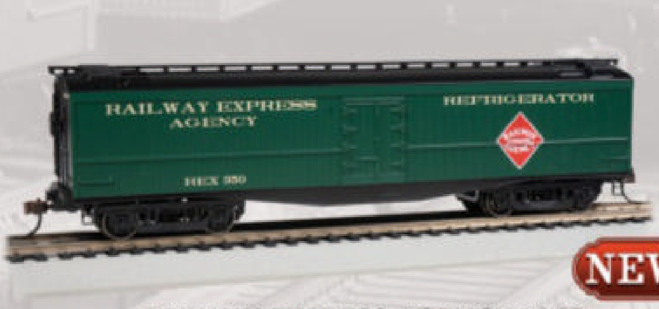
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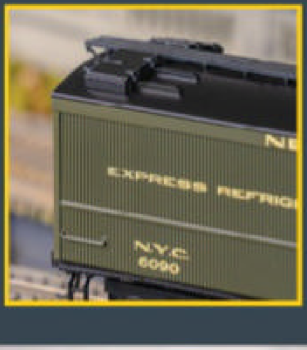
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